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AUSTIN HOBART CLARK ISSUE

DEDICATION

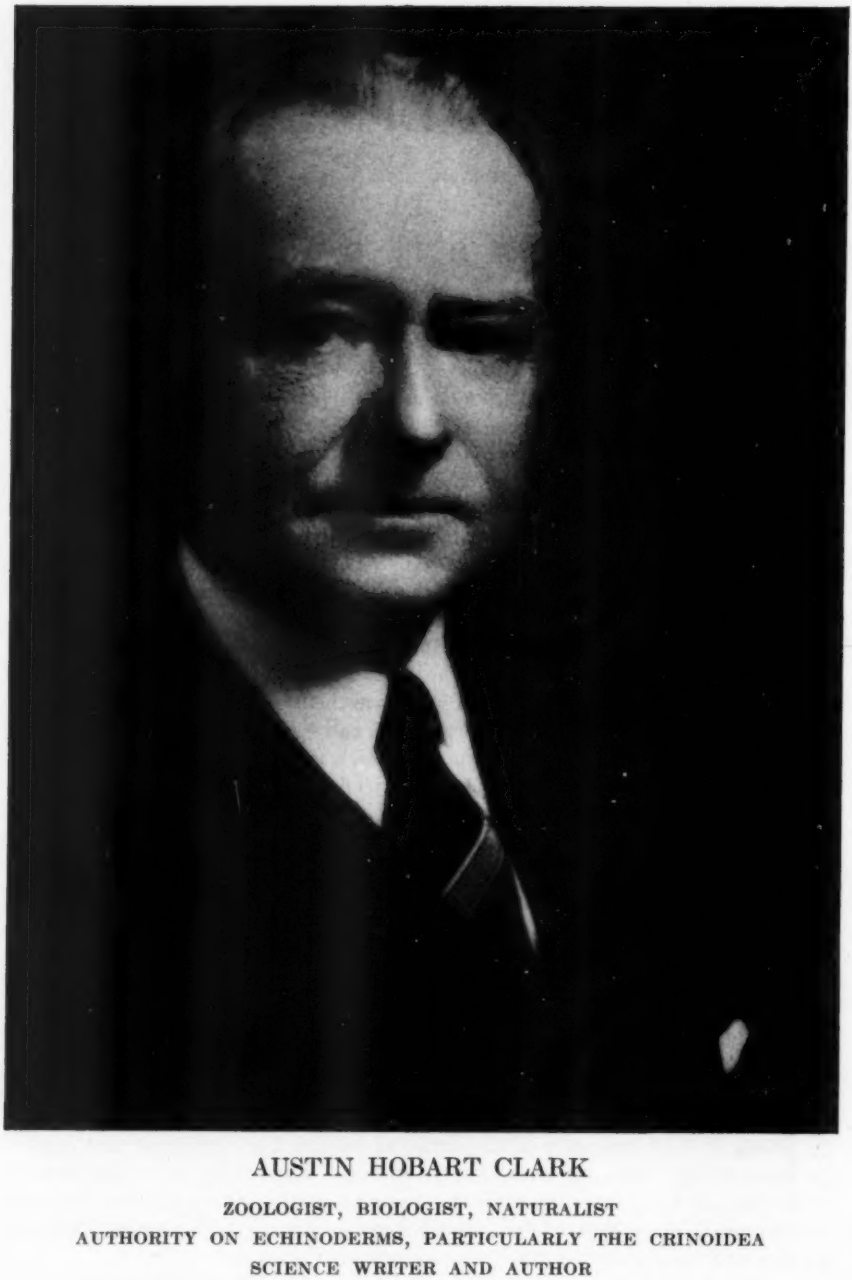
THE PAPERS appearing in this issue of the JOURNAL are written by friends and colleagues of Austin Hobart Clark and form a slight token of their respective authors' regard for him and for his work.* As may be seen from their contents, the papers cover a wide range of material and interests. This is eminently as it should be, for few biologists of our time have embraced within the extent of their knowledge and the scope of their sympathies so many and such diverse portions of the fauna and flora of the world. Although his main published works deal with the echinoderms, and particularly with the crinoids, his bibliography includes many and important contributions to our knowledge of birds, of butterflies, of *Peripatus*, of flowering plants, and even of topics so difficult to classify and pigeonhole as "general natural history." He was for long a leading figure in the popularization of natural history and a prolific contributor to its literature, as witnessed by his two little volumes of *Nature narratives*. He was a pioneer in the now widespread use of current scientific data and materials by the newspapers and was one of the first to sense the application of the radio to the dissemination of scientific news and thoughts. For many years he served as the press and publicity official for the American Association for the Advancement of Science, and he did much to build up the techniques of "science reporting" in this country.

To his colleagues he was, and is, a man to whom anyone could converse about his own pet specialty or even tangential interest with the assurance not only that he would be understood but also that it would elicit some stimulating and thought-provoking comment from him. An unusually broad acquaintance with the forms of living things and a remarkably retentive memory for the literature about them have given Clark the background for such books as his *Animals of land and sea* and *Animals alive*, while his lively curiosity about them conditioned his thinking as expressed in his book on *Zoogenesis*.

When a man attains the age at which his colleagues think of expressing publicly their esteem of him, it is often assumed that he is about to merge gracefully with the ghosts of the forerunners of his particular science. I am confident that none of his many friends have any such thought in mind. Those who know him best are aware that his mind is far too active to assume a passive status and feel that were he to become a ghost he would probably lose no time in organizing among his fellow spirits a new society for the cultivation of scientific interests.

HERBERT FRIEDMANN.

* See note on page 48.



AUSTIN HOBART CLARK

ZOOLOGIST, BIOLOGIST, NATURALIST
AUTHORITY ON ECHINODERMS, PARTICULARLY THE CRINOIDEA
SCIENCE WRITER AND AUTHOR

Born at Wellesley, Mass., December 17, 1880; prepared for college in the high school and in Cutler's School, Newton, Mass.; entered Harvard in 1899, graduated with A.B. degree in 1903.

Member of the Washington Academy of Sciences since April 8, 1912; has been one of its most indefatigable workers and staunchest supporters over the years; president in 1941 and before and since that time vice-president representing two of the affiliated societies, Archeological in 1922, 1923 and Entomological, 1936, 1939–1944; member of the Board of Managers 1926–28, Committee on Meetings 1920–21, 1938, 1939, Committee on Membership 1934, 1938, Committee on Awards for Scientific Achievement (first general chairman) 1940, Subcommittee on Awards in Biological Sciences 1940, 1943, Committee on Policy and Planning 1941–51, Committee on Encouragement of Science Talent 1950–52.

Chief interest, animal life. This, he tells us, began about at the age of 10. Already in 1898 he was abroad a year "getting acquainted with European creatures," and in the following summer he learned to know more of the American ones in the mountains of Tennessee. Two years later, at the head of a personally organized expedition, he was investigating the flora and fauna of Margarita Island, Venezuela; the published results led to his election as a fellow of the Royal (London) Geographic Society in 1904. Following graduation from college in 1903, after a brief sojourn at the then newly established Bermuda biological station, he spent two years exploring the Lesser Antilles. Thereafter, joining the U. S. Bureau of Fisheries, he served as naturalist on the 1906 cruise of the Fisheries steamer *Albatross* to Japan.

Professional career: Collaborator (honorary), United States National Museum 1908; assistant curator, Division of Marine Invertebrates 1909–20; curator, Division of Echinoderms 1920–50; retired December 31, 1950; in 1923 established a series of weekly radio talks given in the name of the Smithsonian Institution.

Affiliations: American Association for the Advancement of Science (news manager and director press service, 1924–29; in charge radio programs, centennial meeting, Washington, D. C., 1948); International Committee on Radio (Comité International de la T.S.F.); American Geophysical Union (chairman for Oceanographic Section); Advisory Committee on Source Bed Studies of the American Petroleum Institute and American Association of Petroleum Geologists; American Association of Museums; Carnegie Corporation and Rockefeller Foundation Conference on Place of Science in Education; Virginia Academy of Science; (2d honorary member; committee on long-range planning and science education); Executive Committee of the Southern Association of Science and Industry; Eighth American Scientific Congress (press relations officer); National Parks Association (trustee); Navy Oceanographic Conference (1924); National Association of Science Writers (first honorary member); American Society of Naturalists; American Ornithologists' Union; Lepidopterists Society (vice-president); Biological Society of Washington; Entomological Society; Cambridge (Massachusetts) Entomological Club; aide-de-camp to the Prince of Monaco during the latter's visit to this country in 1921. In 1927 His Majesty, the King of Denmark and Iceland, conferred upon Austin Clark the Cross of a Knight of the Order of Dannebrog.

Author of more than 650 papers, treatises, and books, technical and popular, chiefly in the field of zoology, marine biology, oceanography, and natural history, crinoids, echinoderms, birds, and Lepidoptera.

Publications especially worthy of mention are: *A Monograph of the existing crinoids; The new evolution—Zoogenesis; Nature narratives; Butterflies of the District of Columbia; Animals of land and sea; Animals alive.*

Married Mary Wendell Upham 1906, deceased 1932; children, two sons, three daughters; 6 grandchildren. Married, Leila Gay Forbes, 1933.

W. L. S.

PALEONTOLOGY.—*New brachiopods from the Lower Cambrian of Virginia.*[1]

G. ARTHUR COOPER, U. S. National Museum.

The brachiopods described and figured herein were collected by several geologists during investigations of the geology about Austinville, Va. The first lot of material was collected by W. Horatio Brown, chief geologist for the New Jersey Zinc Co. at the Bertha Mineral Co. in 1929. Later collections were made by Charles Butts, E. O. Ulrich, George W. and Anna J. Stose, and Charles E. Resser. Most of the brachiopods were too poorly preserved to be recovered from the matrix in identifiable form, but from the large quantity of material collected it was possible to prepare a few first-rate specimens.

The chief obstacle to successful preparation of the specimens was tight cementation to the limestone matrix enclosing them. Several were destroyed in attempting to split them out of the matrix, because the pedicle valve posterior always failed to crack away from the surrounding rock. The same was true after the rock was roasted and plunged in cold water. The anterior and lateral parts of pedicle valves were released, but perfect beaks were never obtained. The reason for this difficulty proved to be a large foramen near the apex through which the filling of the inside was joined to the matrix outside the shell. After this discovery several specimens were cleaned that showed the large apical foramen, which is of considerable interest in brachiopod taxonomy.

These new genera occur in a reef limestone in the Lower Cambrian (Shady) formation with the brachiopods *Kutorgina*, *Nisusia*, *Swantonia*, and *Yorkia*. Characteristic Lower Cambrian trilobites occurring in the same rock are: *Kootenia*, *Rimouskia*, *Bonnia*, and *Labradoria*. These clearly fix the age of the peculiar forms here discussed.

The two species herein described are named in honor of Austin H. Clark in recognition of his great contributions to taxonomy and biology.

Eoconcha, n. gen.

Shell spiriferoid in appearance, strongly and subequally biconvex, with a wide hinge that may or may not form the greatest shell width; brachial valve sulcate; pedicle valve with a low median fold; surface marked by strong direct and intercalated costae.

Palintrope of pedicle valve well developed, generally apsacline; delthryium covered by a convex pseudodeltidium; foramen moderately large, located at or anterior to the apex as in *Nisusia*. Teeth small, inconspicuous, forming by their forward growth a marginal thickening along lateral edges of delthryium; dental plates absent.

Brachial valve with flattened brachiophores located under the notothyrial edge and without supporting plates as in *Nisusia*. Seat of diductor muscle attachment a small callosity located at the apex of the notothryial cavity. Muscular (adductor) scar elongate, located in front of notothyrial callosity on each side of median line.

Genotype: *Eoconcha austini*, n. sp.

Discussion.—The internal characters of this genus are essentially the same as those of *Nisusia* with the exception that in the latter a trace of dental plates has been detected (Cooper,[2] p. 213). Thus the generic definition of this peculiar brachiopod is based mainly on the external features. Although the nature of the pseudodeltidium and palintropes is like that of *Nisusia* the ornamentation, profile and folding are different. The ornamentation of *Eoconcha* consists of simple, strong costae that extend from the beak to the anterior margins or may be intercalated at the front or middle of the shell. The characteristic spines of the *Nisusia* exterior are not present in this new genus.

The brachial valve is provided with a fairly deep median sulcus while the pedicle valve has a more or less well-defined fold. The presence of a sulcus on the brachial valve is a feature common to geologically early or immature brachiopods particularly those of the Orthacea. The brachial sulcus is here regarded as a primitive character.

The actual apical foramen in the specimen on which this genus and species is based was not seen except in one specimen. It is inferred in the others from the fact that the beaks of all pedicle valves are broken away. This is a common feature also of specimens of *Nisusia* similarly preserved.

[1] Received October 6, 1950.

[2] COOPER, G. A. *New Cambrian brachiopods from Alaska*. Journ. Paleont. **10** (3): 210–214, pl. 26. 1936.

Eoconcha austini, n. sp.

Biconvex, wider than long, with the hinge forming the widest part or narrower than the midwidth; cardinal extremities acutely or obtusely angular. Surface costate with 9–13 costae.

Pedicle valve moderately convex to subpyramidal in lateral profile, strongly and somewhat narrowly rounded in anterior profile; median fold originating posterior to the middle, not greatly elevated above the surface of the valve and composed of one to three costae. Lateral slopes convex and moderately steep. Beak obtuse; interarea moderately long, apsacline.

Brachial valve moderately convex in lateral profile and more broadly convex than the pedicle valve in anterior profile. Sulcus shallow, narrow, extending from beak to anterior margin and usually occupied by one costa which is depressed below the two strong costae bounding the sulcus. Flanks with moderately steep slopes to the cardinal extremities.

Measurements in mm.—Pedicle valve (U.S.N.M. no. 111691-a), length 9.2, midwidth 12.0, hinge-width 11.7; (111691-e) length 10.3, midwidth 12.9, hinge-width 12.7, thickness about 5. Brachial valves (111691-i) length 9.8, midwidth 15.4, hinge-width 13.9, thickness 3.9?; (111691-k) length 9.4, midwidth 13.7, hinge-width 15.4?, thickness 4.1?

Types—Holotype, U.S.N.M. no. 111691-a; figured paratypes, U.S.N.M. nos. 111691-d, f, g, h, k, m; unfigured paratypes, U.S.N.M. nos. 111691-b, c, e, i, j, l.

Horizon and locality.—Shady formation, 1 mile east of Austinville, Max Meadows quadrangle, Va.

Discussion.—The strong costae of the exterior distinguish this from any known species of *Nisusia*. No other species of *Eoconcha* is now known.

Matutella, n. gen.

Shell fairly large, syntrophoid in profile and outline; brachial valve strongly uniplicate, pedicle valve deeply sulcate; hinge wide; ornamentation consisting of irregular intercalated and bifurcating costellae.

Pedicle umbo pierced by a large longitudinally oval foramen; palintrope short, delthyrium moderately wide, covered by a convex pseudodeltidium. Dental plates absent. Diductor scars flabellate.

Brachial valve with long flat palintrope with exceptionally broad interarea; notothyrium wide, other details of the interior uncertain.

Genotype: *Matutella clarki*, n. sp.

Discussion.—This genus is quite unlike any other known Paleozoic brachiopod in the extent to which the foramen is developed. This wide foramen existing with a delthyrium covered by a convex pseudodeltidium suggests relationship to the members of the Nisusiidae. *Matutella* differs from *Nisusia* and *Eoconcha* in the exceptionally large foramen and the syntrophoid shape and form of the valves. It differs further from *Eoconcha* in having the high fold on the brachial valve and the deep sulcus on the pedicle valve.

This unusual brachiopod combines primitive and advanced characters to form a paradoxical genus. The external form is that of one of the later brachiopods such as *Syntrophina*, *Platystrophia*, or a narrow-hinged spiriferoid. Casual inspection has led observers to regard specimens as of later age than the Cambrian, so unusual is its form. The strong convexity of both valves is an unusual feature for an early brachiopod. Along with the convexity, as an advanced character, is the deep folding of both valves and the localization of the fold to the brachial valve. In contemporary *Nisusia* the folding is not standardized as it is in *Matutella*, the same species often showing a faint fold or sulcus on the pedicle or brachial valve. This lack of stability in folding is a primitive character whereas the strong localization of the fold to the brachial valve is a feature that has become fixed in most of the advanced members of the Protremata.

Although the folding is that of an advanced brachiopod the ornamentation of *Matutella* is primitive in its lack of standardization and the wavy character of the costellae.

The most unusual feature of the genus is the large foramen that occupies nearly or all of the strongly convex umbo. The beak is located at the narrow end of the oval and is thickened and strengthened at this point. The foramen varies in size on four specimens from 3 by 2 mm to 5 by 3½ mm. So far as can be observed the shell is not noticeably thickened around the margins of the foramen except in the vicinity of the beak.

The interarea of the pedicle valve of *Matutella* is like that of most brachiopods having this form and convexity. It is short, curved generally orthocline or anacline. The teeth are small and

located at the basal angles of the delthyrium as usual in most brachiopods. The pseudodeltidium is narrowly elevated and considerably thickened from the inside and very effectively covers the delthyrium. The latter obviously did not serve as a pedicle opening in this genus. Much of the shell of *Matutella* was so thin that mere traces of the musculature occur on any of the specimens where the valves have been exfoliated. Faint markings that are possible flabellate diductors occur on internal impressions on the anterolateral extremities on each side of the foramen.

The thin shell and poor preservation combine to make preparation of internal characters of the brachial valve almost impossible. The palintrope of this valve is quite unusual in its length and breadth. It is usually deeply striated parallel to the hinge-line by interruptions in growth. The notothyrium is wide but on its margins the characteristic thickenings of brachiophores were not seen on any of the specimens nor were any well-defined sockets seen. One specimen indicates the rudiments of a chilidium in an upward wave of the palintrope at the beak. The musculature is as indefinite as the rest of the structures of this valve. Several exfoliated specimens show vague markings suggesting the musculature of the brachial valve of *Nisusia*.

Matutella clarki, n. sp.

Shell large for a Cambrian genus, wider than long, with the hinge slightly less than the greatest shell width, which is located a short distance anterior to the middle. Cardinal extremities obtuse or nearly rectangular with small ears on pedicle valve. Sides moderately convex; anterior commissure strongly uniplicate. Surface marked by narrowly rounded radiating but irregular costellae which fade out on the cardinal extremities. Costellae increasing by bifurcation and intercalation. Fine concentric growth lines over the entire shell.

Pedicle valve moderately convex in lateral profile but with the umbonal region truncated by the foramen; anterior profile deeply sulcate; sulcus originating slightly anterior to the foramen, deepening and widening rapidly to equal about half the width of the valve; sulcus extended toward the brachial valve into a long and sharply pointed tongue bent nearly at right angles to the lateral commissure. Flanks bounding sulcus narrowly rounded in anterior profile with steep slopes to the cardinal extremities. Interarea short, about orthocline in position. Beak small incurved; foramen large and longitudinally elliptical.

Brachial valve gently convex in lateral profile, most noticeably convex in the umbonal region; anterior profile almost semicircular but with flattened top; fold originating less than one-third the length from the beak, narrowly rounded to subcarinate and most strongly elevated at anterior. Flanks bounding fold gently rounded and with steep slopes to the sides and cardinal extremities. Interarea long, orthocline (?).

Measurements in mm.—Holotype, pedicle valve, length 13.4, width at middle 17.6, hinge-

FIGS. 1–3.—*Nisusia borealis* Cooper: 1, Apical view of young pedicle valve showing elevated pseudodeltidium and large foramen, ×3, U.S.N.M. no. 91903-a; 2, 3, respectively posterior and apical views of an incomplete adult pedicle valve, ×4, showing elevated pseudodeltidium, hypotype, U.S.N.M. no. 111692. Introduced for comparison with *Eoconcha* and *Matutella*.

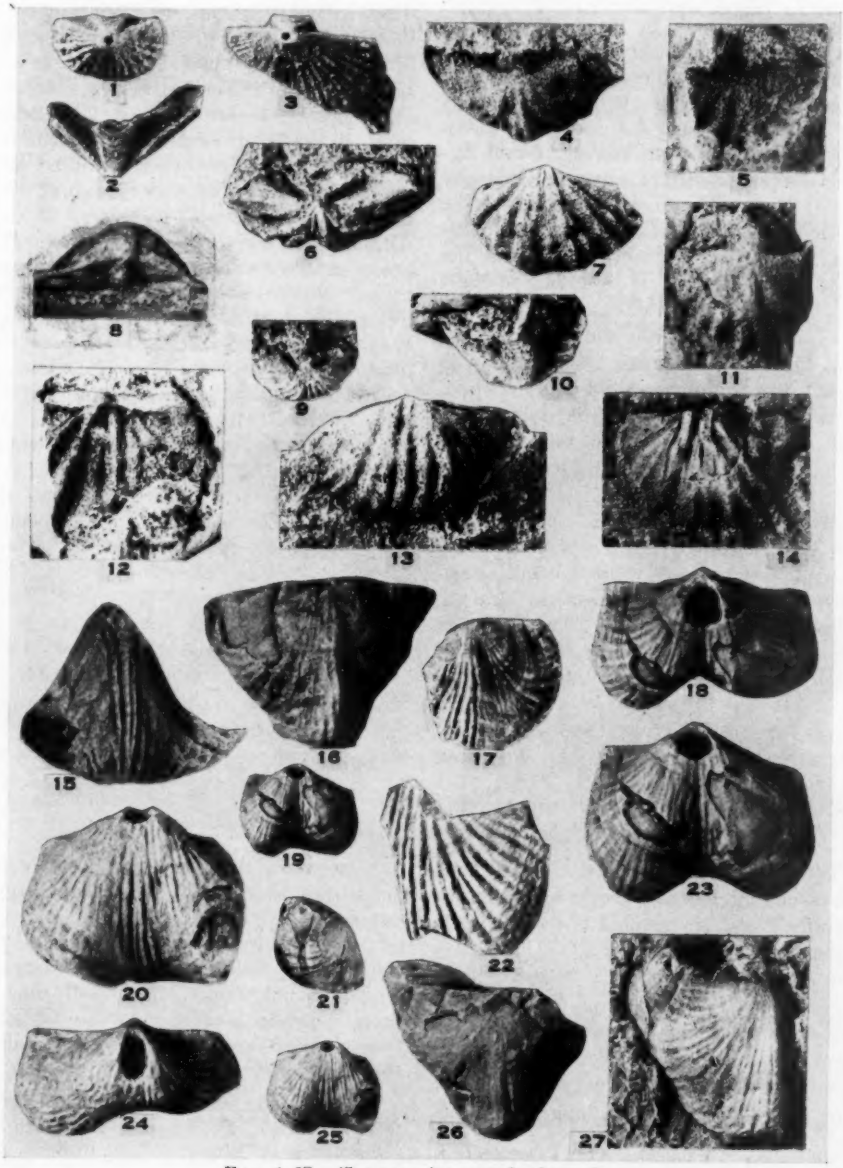
FIGS. 4–7, 9–14.—*Eoconcha austini* Cooper, n. gen., n. sp.: 4, Posterior view of an impression of the interior of a pedicle valve showing convex pseudodeltidium and thickening along delthyrial edge representing growth track of teeth, ×2, paratype, U.S.N.M. no. 111691-d; 5, impression of apex of pedicle valve showing convex pseudodeltidium, ×2, holotype, U.S.N.M. no. 111691-a; 10, 11, posterior and apical views of a wax replica of the pedicle valve prepared from impression illustrated in Fig. 5 (shows pseudodeltidium and foramen, the latter imperfectly, ×2); 6, 7, respectively posterior and brachial views of the impression of a brachial valve, ×2, ×1½, showing impression of brachiophores, paratype, U.S.N.M. no. 111691-g; 9, posterior view of an internal impression of a pedicle valve showing fractured apex indicating presence of open foramen, ×1, paratype, U.S.N.M. no. 111691-m; 12, wax replica of interior of a brachial valve showing primitive brachiophores, ×2, paratype, U.S.N.M. no. 111691-h; 13, impression of a brachial valve showing costae, ×2, paratype, U.S.N.M. no. 111691-k; 14, impression of brachial interior showing probable adductor muscle impressions, ×2, paratype, U.S.N.M. no. 111691-f.

FIGS. 8, 15–27.—*Matutella clarki* Cooper, n. gen., n. sp.: 8, Pedicle interarea showing rounded pseudodeltidium, ×2, paratype, U.S.N.M. no. 111689-e; 19, 25, exterior of two pedicle valves, ×1, respectively holotype, U.S.N.M. no. 111689-a, and paratype, U.S.N.M. no. 111689-d; 15, 20, 24, respectively anterior, exterior, and posterior views of the pedicle valve, ×2, paratype, U.S.N.M. no. 111689-d; 16, exterior of a large but imperfect brachial valve, ×2, paratype, U.S.N.M. no. 111689-k; 17. Imperfect brachial valve showing ornamentation, ×2, paratype, U.S.N.M. no. 111689-g; 18, 23, respectively posterior and exterior views of the holotype, ×2, showing foramen and ornamentation; 22, fragment of exterior enlarged to show details of costella, ×3, paratype, U.S.N.M. no. 111689-e; 21, 26, 27, respectively side, ×1, internal impression, and exterior views of a brachial valve, ×2, paratype U.S.N.M. no. 111689-n. (Fig. 27 is a wax replica of the exterior taken from an impression of the exterior.)

width 13.1, width of sulcus 9.6, thickness 3.7. Brachial valve (U.S.N.M. no. 111689-n) measured on half specimen, then doubled to obtain approximate measurements, length 13.2, mid-width 17.2, thickness 9.2.

Types.—Holotype, U.S.N.M. no. 111689-a; figured paratypes, U.S.N.M. nos. 111689-c, d, e, g, k, n; unfigured paratypes, U.S.N.M. nos. 111689-b, f, h, i, j, l, m, o.

Horizon and locality.—Shady formation (reefs), Buddle Branch, ¾ mile northeast of Austinville, Max Meadows quadrangle, Va.



FIGS. 1–27.—(See opposite page for legend).

DISCUSSION OF THE GENERA

The brachiopods discussed herein are of considerable interest because they are obviously highly specialized along certain lines, yet they are among the earliest of known articulate brachiopods. They are thus primitive but highly specialized brachiopods. *Paterina* was regarded by Beecher and Schuchert as the most primitive brachiopod and the one nearest the theoretical brachiopod progenitor. Inasmuch as these peculiar shells from Virginia occur with the primitive *Paterina*, they have an interesting and significant importance in brachiopod taxonomy and phylogeny. They help to emphasize the fact that in the articulates the pseudodeltidium is a primitive feature, whereas the unmodified delthyrium is an advanced character. They also indicate that the articulates must have a long ancestry in the pre-Cambrian. *Paterina* itself must be considered as an early but highly specialized brachiopod. Its structure is so unusual that it must be ruled out as near the progenitor of the brachiopods. The most primitive shelled brachiopod is yet to be found.

Although the presence of a pseudodeltidium is an accepted primitive character in articulate brachiopods, it has not been sufficiently emphasized that an apical foramen is also a primitive character. The foramina of the genera herein described and of *Nisusia* differ from those of later genera having an apical foramen in the size and location of the opening. In these early Cambrian genera such as *Nisusia* the foramen is excavated in the pedicle umbo rather than in the apex, a position that is seldom occupied by a foramen other than the type produced by anterior pedicle migration in the later brachiopods. This is especially true of *Matutella* with its strongly arched beak the umbo of which is truncated by a large oval foramen. This foramen is quite unlike any other known and is not produced by resorption of the beak due to pedicle pressure as often takes place in the Terebratulacea. A foramen like that of *Nisusia* occurs in later brachiopods in the young of many Strophomenidae such as *Leptaena*, *Strophomena* and *Christiania* in which extremely youthful shells have the apex occupied by a large foramen. Although the young of the Strophomenidae are often *Nisusia*-like in their appearance it is not at present possible to derive this group out of *Nisusia* for the simple reason that the first unquestioned strophomenid, *Taffia*, occurs in the Upper Canadian. No forms are known that bridge the long time gulf between the two.

Cambrian Articulate brachiopods are too poorly known to state whether or not *Nisusia* and allies disappeared without issue. The known later Cambrian brachiopods are either without apical foramina, have an open delthyrium (*Eoorthis*) or have the foramen confined to the deltidium (*Billingsella*. For the present it is best just to emphasize the fact that the earliest known Articulates had a more or less large foramen situated on the pedicle umbo anterior to the apex of the pseudodeltidium or truncating the apex because of pedicle pressure.

PALEONTOLOGY.—*Two new guide fossils from the Tallahatta formation of the Southeastern States.*[1] JULIA GARDNER, U. S. Geological Survey.

Though the name of Austin Hobart Clark is most closely associated with echinoderms, butterflies, and birds, most of us who have frequented the United States National Museum for the past few decades have, from time to time, sought Mr. Clark's aid on problems in our own particular fields, and not in vain. All animals alive are his interest, even *Homo sapiens*. The two species about to be inscribed to him are long since dead, to be sure, but the inscription does not seem inappropriate, for as Mr. Clark has served as our guide, philosopher, and friend, helping us to orient ourselves and to check our positions in the world about us, so wavering students coming upon these fossils may find them dependable guides to the Tallahatta formation of the middle Eocene, usually to the upper part of the Tallahatta.

Genus **Anodontia** Link, 1807

Anodontia Link, Beschreibung der Naturalien-Sammlung der Universität zu Rostock, pt. 3: 157. 1807.

[1] Published by permission of the Director, U. S. Geological Survey, Received October 6, 1950.

Type by monotypy: *Anodontia alba* Link = *Venus edentula* Linnaeus.

Link styled his genus the *Glattmuschel* and briefly characterized it as: Equivalve, the valves closed, without ears; the hinge without teeth; the anterior muscle scar much longer than the posterior; the ligament external. He cited two references—Chemnitz's *Conchylien-Cabinet* **7:** pl. 39, figs. 410 and 411, which illustrate a venerid; and the Gmelin of Linnaeus, p. 3286. Figures 408 and 409 of plate 39 of Chemnitz illustrate the "Venus of Jamaica" and figures 427 to 429 on plate 40, *Venus edentula*. The mechanics of the typographical error that resulted in the reference as it appeared in Link are difficult to reconstruct. The explanation suggested by Stewart (pp. 179–180)[2] forced him to the unhappy necessity of designating *Lucina jamaicensis* Lamarck as the genotype. A simpler interpretation was offered in a discussion with Dr. Harald A. Rehder, Curator of mollusks in the United States National Museum. He suggested that Link may never have even seen the Conchylien-Cabinet, that he took the reference to Chemnitz directly from Gmelin, but that in so doing his eye slipped up the page and he copied the notation under the preceding species, *V. scripta* (pl. 39, figs. 410–411) in place of that under *Venus edentula* (pl. 40, figs. 427–429). That solution is here accepted.

[2] STEWART, RALPH B., *Gabb's California Cretaceous and Tertiary type lamellibranchs*, Acad. Nat. Sci. Philadelphia Spec. Publ. no. 3, 314 pp., 17 pls. 1930.

Anodontia? augustana Gardner, n. sp.

Fig. 1, *a–e*

Shells large, most commonly represented by globose molds of the interior, broader than they are high and subject to distortion by a shortening along the vertical axis; in the normal shells, the distance from the beaks to the ventral margin is

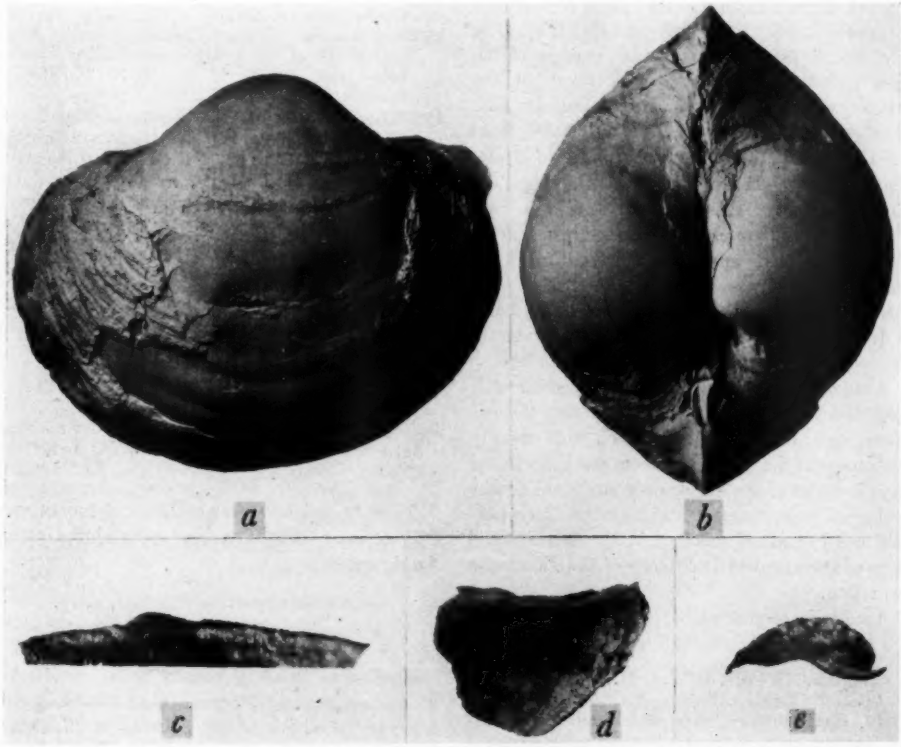


FIG. 1.—*Anodontia? augustana* Gardner, n. sp.: *a*, Side view of right valve of holotype; *b*, umbonal view of double valves of holotype; *c*, hinge of incomplete paratype (U.S.N.M. no. 560588); *d*, fragment of hinge of paratype (U.S.N.M. no. 560590); *e*, exterior of broken anterior dorsal margin (U.S.N.M. no. 560590). All natural size.

only a little more than the diameter. In place of a lunule, a flaring anterior margin, reflected over the umbones somewhat in the manner of the pholads. Shell flattening toward the posterior dorsal margin but no defined escutcheon. Hinge edentulous. Ligament groove deep, the ligament conspicuous, and in some of the larger specimens arching above the escutcheon; ligament and resilium may have been partially separated. Muscle scars not traceable in any of the shells available. Obscure radiating lines, about six to the centimeter, evident on molds of interior. No defined sculpture pattern on exterior of shell but an irregular concentric wrinkling over the entire outer surface.

Dimensions of holotype, an interior mold of paired valves with fragments of shell adhering: Height, 60 mm; width, 78 mm; diameter, 57 mm. Paratypes too fragmentary to measure.

Holotype, U.S.N.M. no. 560587, from Lisbon Bluff, Alabama River, 3 feet or less below the contact of the Tallahatta and Lisbon formations, Monroe County, Ala. Paratype (Fig. 1, *c*), U.S. N.M. no. 560588, from U.S.G.S. station 15159, Fort Gaines-Abbeville road just south of the bridge over McRae Creek, Henry County, Ala. Paratype (Fig. 1, *d–e*), U.S.N.M. no. 560590, from U.S.G.S. station 15475, south slope to Little Choctawatchee River, on State Highway 66, Houston County, Ala.

The upward flare of the anterior dorsal margin is unlike that of any known Recent or fossil lucinoid and probably is a character of more than specific value. But the material is so limited and so fragmentary that, awaiting further evidence, the species is referred to *Anodontia* sensu lato.

Anodontia? augustana must have been a fragile shell and in need of protection through the environment. It probably lived on soft muddy bottoms near the mouths of rivers and in sheltered bays in water of shallow or only moderate depths sheltered from strong current action. Such bottom conditions are reflected in the fine silicified clays of the so-called Buhrstone of the Tallahatta formation.

Anodontia augustana has been recorded from the following U.S.G.S. stations:

No number. NW¼ sec. 34, T. 11 N., R. 2 W., east of Toxey, Choctaw County, Ala.

17919. Little Stave Creek, directly below Tallahatta-Lisbon contact; about 4½ miles north of Jackson, Clarke County, Ala.

14785-g. Little Stave Creek, between 5 and 10 feet below Tallahatta-Lisbon contact; about 4½ miles north of Jackson, Clarke County, Ala.

15924. Contact of siliceous clay and overlying greensand, 3 miles northeast of Chilton on Thomasville road, Clarke County, Ala.

15925. Long slope leading down to Silver Creek about 6 miles west-southwest of Chance on Dickenson road, Clarke County, Ala.

15920. About 1½ miles west of Chance on Dickenson road, Clarke County, Ala.

17090. Lisbon Bluff, Alabama River, 3 feet or less below the Tallahatta-Lisbon contact, Monroe County, Ala. Type locality.

13442. Lisbon Bluff, Alabama River, within 10 feet of Tallahatta-Lisbon contact, Monroe County, Ala.

13441. Lisbon Bluff, Alabama River, within 10.5 feet of Tallahatta-Lisbon contact, Monroe County, Ala.

15132. Railroad cut in south center of sec. 14, T. 8 N., R. 8 E., Monroe County, Ala.

15480. East bank of Conecuh River about 200 yards above highway bridge at River Falls, Covington County, Ala.

11091. Hays Creek at Bedsole's old mill road from Elba to Kinston, S½ sec. 15, T. 4 N., R. 19 E., Coffee County, Ala.

15159. Road cut on Fort Gaines-Abbeville road just south of the bridge over McRae Creek, center sec. 12, T. 17 N., R. 29 E., Henry County, Ala.

15475. South slope to Little Choctawhatchee River in road cut on new State Highway 66, SE¼ sec. 34, T. 4 N., R. 24 E., Houston County, Ala. Shells silicified.

7728. Warley Hill, 7 miles southeast of Fort Motte on Lonestar road, Calhoun County, S. C. A mold 92 mm wide from Bed No. 8 of Cooke section.

No number. Road cut on South side of Halfway Swamp Creek about 2½ miles northwest of Creston, Calhoun County, S. C. A mold 140 mm wide from the Congaree clay of Sloan.

Genus **Spiratella** de Blainville, 1817

Spiratella de Blainville, Dictionnaire des sciences naturelles **9**: 407. 1817. = *Limacina* Lamarck, 1819.

Type by original designation and monotypy: *Clio helicina* Phipps (exceedingly abundant in Arctic waters).

Spiratella augustana Gardner, n. sp.

Fig. 2, *a–c*

Shell very small. Whorls 4 to 4½, sinistrally coiled in a nearly horizontal plane, the body embracing the whorls of the spire as in *Planorbis*. The aperture higher than it is wide, the body expanding at the aperture both vertically and hor-

izontally; the outer surface of the preceding whorl forming the inner wall of the aperture; posterior margin of the body folded into the suture. The visible surface of the apical whorls rounded, scarcely elevated above the plane of the body. Umbilical area narrowly funicular. No sculpture other than obscure incrementals and the cording of the adult margin of the outer lip.

Dimensions of holotype, U.S.N.M. no. 560589: Maximum diameter, 3 mm; diameter at right angles to the maximum diameter, 2.6 mm; minimum diameter 2.3 mm; height, 1.5 mm.

Type locality: U.S.G.S. station 17911, between 15 and 20 feet below the contact of the Tallahatta and Lisbon formations and 4 feet above the stream bed of Little Stave, 4½ miles north of Jackson, Clarke County, Ala.

Even the ordinal relationships of these shells resembling small sinistral *Planorbis* and locally common in the marine faunas of the upper Tallahatta baffled me. I sought the guidance of that dean of malacologists, Dr. Henry A. Pilsbry, and to good purpose. I am grateful to him for his never-failing aid.

The species I described in 1927 as *Planorbis andersoni*[3] is doubtless closely related, though not identical. The Texas form is smaller, which may or may not be significant. It is also more compressed and is more regular in form. The outer lip is less expanded, and the body whorl, both on the apical and umbilical surfaces, is rather sharply keeled. The locality, U.S.G.S. station 9264, three-fourths of a mile south of Elkhart, Anderson County, Tex., is in the Weches greensand member of the Mount Selman formation, which correlates roughly with the Tallahatta formation.

The range of variation in these small forms is difficult to establish. They vary in size, in the height of the spire, and, owing largely to warping, in the outline of the outer lip. The type individual is one of the largest collected, the apical whorls are less elevated than in many, and the margin of the outer lip is broken, destroying the minutely elliptical outline of the aperture, which is characteristic of the species.

Probably the fossil pteropods have a much wider distribution than the literature indicates, for the shells are all small and easily overlooked. Among the related forms are *Limacina inflata* (d'Orbigny), 1835, a warm-water Recent species,

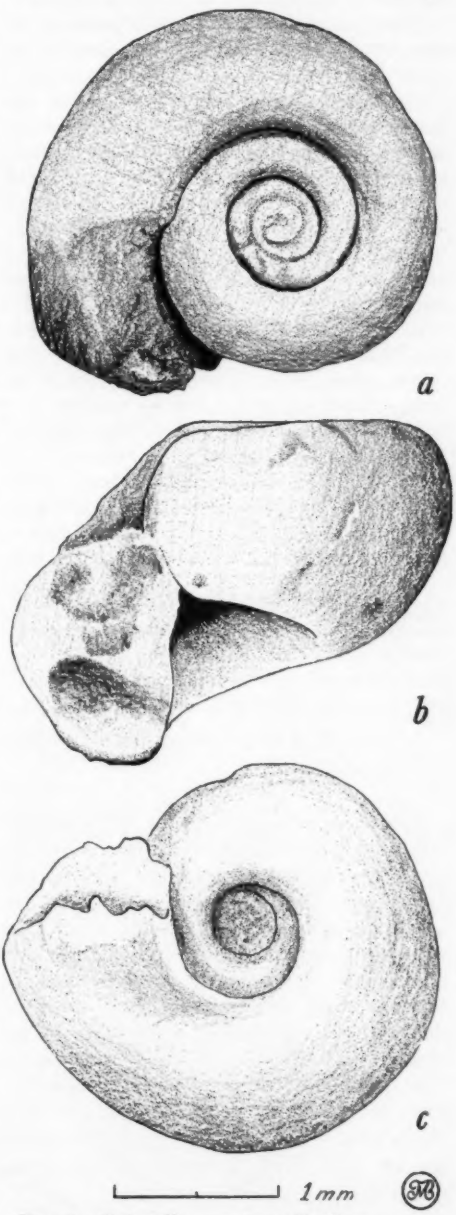


FIG. 2.—*Spiratella augustana* Gardner, n. sp.: *a*, Apical view of holotype; *b*, profile of holotype; *c*, umbilical view of holotype.

[3] GARDNER, JULIA A., *New species of mollusks from the Eocene of Texas*. Journ. Washington Acad. Sci., **17** (14): 362–383, 4 pls., 44 figs. 1927.

and *Limacina elevata* Collins,[4] described from the middle Miocene of Santa Rosa, Veracruz, Mexico.

Many of the Recent species, possibly the majority, are to be found in the plankton of the Arctic.

The distribution of *Spiratella augustana*, like that of other planktonic forms, is independent of the character of the bottom except as bottom conditions affect the preservation of the dead shell. The species is contained in glauconitic sandy clays, glauconitic sands, and blocky siliceous clays. Except for a few interruptions by oyster reefs, *Spiratella augustana* is disseminated through almost the entire upper 57 feet of Tallahatta exposed along Little Stave Creek, at Lisbon Bluff and in a few nearby localities. The species seems also to lightly overstep the Tallahatta-Lisbon contact and may be recorded by a few closely related if not identical individuals in the lower 10 feet of the Lisbon formation.

DISTRIBUTION: Tallahatta formation. Little Stave Creek, 4¼ miles north of Jackson, Clarke County, Alabama; U.S.G.S. station 14785 b–e, from 10 to 20 feet below the *Ostrea johnsoni* bed; U.S.G.S. station 14431, 40 feet below the top of the Tallahatta formation; between the *Ostrea johnsoni* bed and the Tallahatta-Lisbon contact, U.S.G.S. stations 14785 f–h, 17910, 17911, 17913, 17907, 17909, 17912, 17926, 17927, 17916 a–b, 17919 a: Lisbon Bluff, Lisbon Landing, Alabama River, Monroe County, Ala.; U.S.G.S. station 13430, bluish-black clay at base of section; U.S.G.S. stations 13440 and 13443, indurated layer about 8 feet below the Tallahatta-Lisbon contact; and U.S.G.S. station 13442, dense blue-gray clay with lucinoid molds directly below the fucoidal layer and not more than 5 feet below the Tallahatta-Lisbon contact; U.S.G.S. station 14799, 3.8 miles east of Silas on Bladen Springs road, Choctaw County, Ala.

Within the area, *Spiratella augustana* is most common at the stations on Little Stave Creek between the *Ostrea johnsoni* bed and a level a little below the Tallahatta-Lisbon contact. It is present, however, up to the very contact, to the blocky siliceous clays of the contact specimen itself.

Closely related though possibly not specifically identical individuals have been recovered from levels not more than 10 feet above the contact at U.S.G.S. stations 17917, 17923, and 17924.

[4] COLLINS, ROBERT LEE, *A monograph of the American Tertiary pteropod mollusks*. Johns Hopkins Univ. Stud. Geol. no. 11: 137–234, pls. 7–14. 1934.

PALEONTOLOGY.—Nucula austinclarki, *n. sp., a concentrically sculptured* Nucula *from the Lisbon formation of Alabama.*[1] F. STEARNS MACNEIL, U. S. Geological Survey.

Strong concentric sculpture, although not unknown, is so unusual among the Nuculidae that the question arises as to whether the few species that possess it are closely related and constitute a natural generic or subgeneric group. The ribs on different species are so dissimilar in cross section, however, that this close relationship seems doubtful. In some species the ribs are inclined steps with the high, sharp edge on the dorsal side, as in *Nucula austinclarki*, here described. In other species the high sharp edge is on the ventral side. Still other species have more symmetrical ribs with either sharp or rounded crests.

According to Schenck,[2] the primary division of the Nuculidae should be on the presence or absence of denticulations of the ventral margin. All the species with concentric sculpture except one have denticulations on the ventral margins, and all these are referred to *Nucula* s.s. on the basis of shape, teeth, and ligament. Only one form, the genus *Nuculoma* of Cossmann, with concentric sculpture and no marginal denticulations is known. *Nuculoma*, which is known only from the Jurassic, appears from the figures to have concentric ribs that are gently inclined on the dorsal side and sharp on the ventral side, just the reverse of the condition in the species here described.

[1] Published by permission of the Director, U. S. Geological Survey.

[2] SCHENCK, HUBERT G., Bull. Mus. Royal Hist. Nat. Belgique **10** (20): 18. 1934.

Three species of *Nucula* with concentric sculpture were listed by Schenck. They are: *N. haesendonckii* Nyst and Westendorp, from the Anversian (upper Miocene) of Holland, a species with *Inoceramus*-like concentric ribs, *N. compressa* Philippi, from the Chattian (upper Oligocene) of Belgium, described as having "distinct concentric undulations," and *N. duchastelii* Nyst, from the Rupelian (middle Oligocene) of Belgium, a species with strong but very irregular concentric ridges that converge and diverge across the shell.

In addition to these Oligocene and Miocene species, two other Miocene and a Recent species have been described. *Nucula (Nucula) njalindungensis* Martin, from the lower Miocene of Java and Borneo, like *N. duchastelii*, has concentric lines that freely converge and diverge. *Nucula prunicola*, Dall, from the middle Miocene of Maryland has concentric ribs that are highest and sharp at the dorsal edge and gently sloping on the ventral side. They are thus of the same type as those of the new species but are developed at the anterior end of the shell only. The chondrophore of *N. prunicola* is also much narrower than that of the species here described. *Nucula exigua* Sowerby is living from California to southern Mexico. It has concentric lirations that are more or less symmetrical and are highest along a central crest.

From the Eocene three species with concentric sculpture have been described. The new species is also of Eocene age. Two of these are from the Calcaire grossier of France, *N. capillacea* Deshayes and *N. minor* Deshayes. The third was described from the London clay of England as *N. regnorum* Wrigley. All these species are small, the largest specimen of *N. regnorum* measuring 8.0 mm, and both of Deshayes's species being less than 5.0 mm in length.

A description of the new Eocene species follows:

Genus **Nucula** Lamarck, 1799

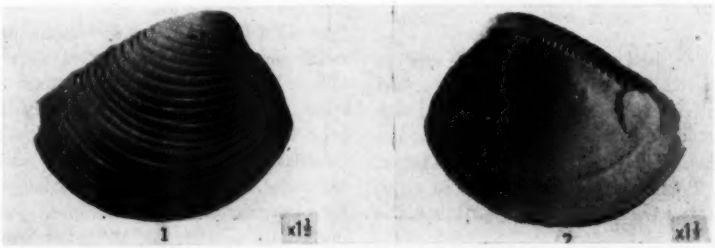
Type: *Arca nucleus* Linnaeus.

The species here described is characterized by its very unusual concentric sculpture. The shell is large for the genus, but on the basis of its shape, teeth, ligament, and marginal denticulations it appears to be a typical *Nucula*.

Nucula austinclarki MacNeil, n. sp.

Figs. 1, 2

Shell large and medium inflated, subovate; anterior dorsal margin gently curved; anterior extremity blunt but straighter along the dorsal margin; lunular area subrostrate; posterior margin gently curved; posterior extremity subangulate; escutcheonal area truncate, with the posterior ridge curving gently in a direction opposite to the curve of the posterior margin; outer surface sculptured by strong concentric ribs that are inclinded and low on the ventral side, but with a sharp, usually undercut edge on the dorsal side; most of the ribs continuous around the shell but an occasional one is partly covered or overlapped by the next younger one; ribs with faint radial lines at some points; ventral margin with well developed dentieulations; teeth on the anterior side regular and nesting within each other, about 22 in number, posterior teeth less regular, not forming a uniformly chevroned series, about 10 in number; interior smooth, muscle scars impressed, pallial line strong and entire.



FIGS. 1, 2.—*Nucula austin clarki* MacNeil, n. sp., Middle Eocene, Lisbon formation, Clarke County, Ala.; holotype (U.S.N.M. no. 560585): 1, Exterior; 2, interior.

Holotype (a left valve) (U.S.N.M. no. 560585) measures: Height 22 mm, length 27 mm, diameter of single valve 7.8 mm.

Type locality and only known occurrence: A gully in the west center of sec. 10, T. 9 N., R. 4 E., Clarke County, Ala. The gully lies on the south side of the county road.

This species is closely related to *Nucula magnifica* Conrad, a species described from the Gosport sand in the upper part of the Claiborne group of Alabama, and also present in the Lisbon formation of Alabama and the equivalent portion of the McBean formation of eastern Georgia and South Carolina in the middle part of the Claiborne group. In shape, size, and dentition the two species are nearly identical. *Nucula magnifica* has a smooth surface, but occasional specimens show a slight tendency for the development of concentric markings similar to those of *N. austinclarki* at a point or two along the posterior ridge.

Nucula austinclarki is from the Lisbon formation, the middle part of the Claiborne group in Alabama. Its association with *Ostrea sellaeformis* indicates that it is from the middle or upper part of the Lisbon and not from the lowest part, which carries *Ostrea lisbonensis*, the apparent forerunner of *O. sellaeformis*. From the general field relations it appears to occur in the lower part of the range of *Ostrea sellaeformis*. *Nucula magnifica* is apparently a younger species than *N. austinclarki*, being known from the upper part of the range of *Ostrea sellaeformis* and from the Gosport sand, which is stratigraphically higher than the upper limit of the range of *Ostrea sellaeformis*.

MALACOLOGY.—*New stenothyrid gastropods from the Philippines (Rissoidae).*[1]

R. TUCKER ABBOTT, U. S. National Museum. (Communicated by H. A. Rehder.)

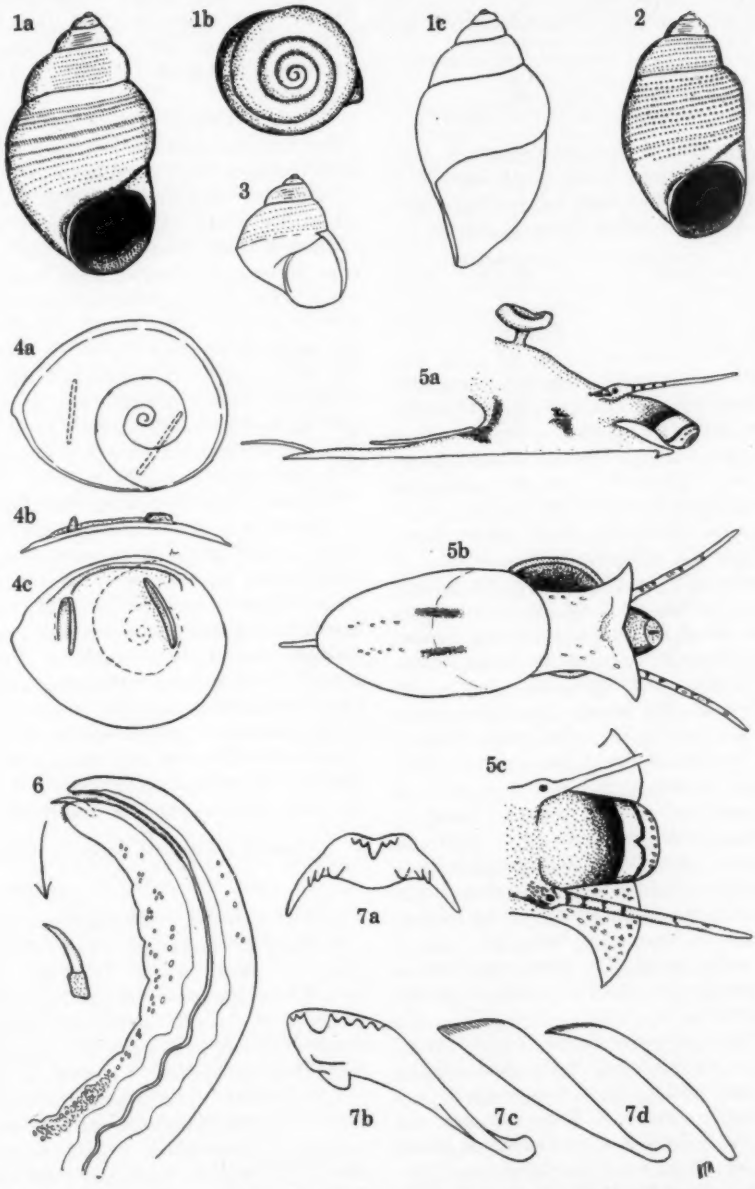
During a survey of fresh-water mollusks in 1945 on the Island of Leyte, Republic of the Philippines, ecological and morphological notes were made on living specimens of a species of *Stenothyra* Benson, 1856, which has subsequently proved to be undescribed. An undescribed subspecies from Mindoro Island of this polytypic species was found in the U. S. National Museum. It was collected in the 1880's by J. F. Quadras and bore the manuscript name of "philippinica Moellendorff." These two gastropods are named in honor of Austin H. Clark, retiring curator of echinoderms, United States National Museum, who has given me great encouragement and help.

Stenothyra austini, n. sp.

Figs. 1, 3–7

Description.—Shell small, about 3.0 mm in length, ovoid, relatively thick-shelled, compressed ventrally, with a small circular aperture, and with unevenly developed whorls. Spire blunt and somewhat rounded. Nuclear whorls 1½ in number, transparent. Postnuclear whorls 3 to 4 in number, increasing irregularly in size (so that the ventral face is flattened) until the last whorl, when they then decrease in size and form the relatively small, circular aperture. Periphery of early whorls well-rounded; last whorl moderately rounded. Suture finely and sharply impressed. Base of shell set at 45° to the axis of the shell, slightly convex, and thickened slightly in the area near the very small umbilicus. Aperture almost circular, with a slightly thickened continuous peristome. Behind the lip, on the exterior of the body whorl, there is a slightly thickened, smooth varix. Axial sculpture absent. Spiral sculpture consists of 10 to 15 rows of microscopic pits on the upper two-thirds of the whorl. The pits may be round, squarish or oblong. Umbilicus reduced to a minute chink. Color of shell from yellowish tan to light brown. In living specimens, the shell is translucent and the pits appear as tiny bubbles embedded in the shell. Periostracum thin, light tan. In living specimens, it covers the small pits. It is often covered with a blackish film of organic detritus. Operculum almost circular, chitinous, paucispiral, with the nucleus near the center. There are two raised, oblong lamellae of chitin reinforcing the surface of attachment. The anterior, inner edge is reinforced by a low, curved ridge (see Fig. 4). In adults, the operculum is often slightly larger than the aperture and incapable of being withdrawn into the shell.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received October 6, 1950.



FIGS. 1, 3–7.—*Stenothyra austini austini:* 1, Holotype shell (×10) (*a*, apertural view; *b*, apical view; *c*, side view); 3, immature shell; 4, operculum (*a*, outer view; *b*, side view; *c*, inner view); 5, living animal (*a*, lateral view; *b*, ventral view; *c*, dorsal view of head region); 6, male genitalia (verge); 7, radula (*a*, rachidian; *b*, lateral; *c*, inner marginal; *d*, outer marginal).

FIG. 2.—*Stenothyra austini clarki*, holotype shell (×10).

Measurements of shell (mm)			
Length	*Width*	*Aperture*	*Whorls*
4.0	2.2	1.2 by 1.2	5.3 (holotype)
4.0	2.1	1.3 by 1.3	5.5 (paratypes)
3.5	2.1	1.0 by 1.1	5.0 (U.S.N.M. No. 603670)
3.3	1.8	0.9 by 1.0	5.0 U.S.N.M.
2.8	1.7	0.8 by 0.9	4.9 U.S.N.M.
2.1	1.6	1.1 by 1.0	4.0 U.S.N.M. (young)

Measurements of 97 adult paratypes from San Joaquin Estuary, eastern Leyte Island (U.S.N.M. no. 603671) were made to a tenth of a millimeter and grouped in the following classes:

Length (mm)	*Number of specimens*
2.6–2.9	13
3.0–3.3	47
3.4–3.7	35
3.8–4.2	2

Animal.—Small and capable of being completely retracted into the shell. Foot relatively long, flat, with the anterior corners produced laterally, and with a transverse division across the sole about halfway back and at a point coinciding with the anterior edge of the operculum. Anterior edge of foot with a deep, narrow, transverse mucus slit which bears minute cilia. A bulbous pedal gland may be seen at the anterior end from a ventral view. At the posterior end and dorsal side of the foot there is a long, slender, fleshy rod. Proboscis large, swollen in the middle, with two circular color bars of black-brown near the anterior end. The posterior bar fades posteriorly into an area of dark reddish brown. Between the bars the flesh is bright, straw-yellow. Tentacles long, slender, flecked with bars of black and an occasional internal granular clump of yellow. Area about eye dark gray, posteriorly with a heavy concentration of embedded light-straw granules. Mantle light gray with heavy mottlings of black. Verge located on the midline of the "back" of the animal. It is in the form of a coiled, single prong. The distal end bears a minute calcareous spine. The radula is taenioglossate (see Fig. 7).

The typical subspecies *austini austini* is characterized by the weak pits in the shell and the irregular spacing of the spiral rows of pits.

Type locality.—Bridge at Kaboynan, near the mouth of the north fork of the Guinarona River, Leyte Island, Republic of the Philippines. R. T. Abbott, legit, June 18, 1945.

Types.—Holotype, U.S.N.M. no. 603669. Paratypes from the type locality, U.S.N.M. no. 603670, and in the Museum of Comparative Zoology, Cambridge, Mass. (the latter collected by M. S. Ferguson). Paratypes also from San Joaquin Estuary, eastern Leyte Island, R. T. Abbott, legit, June 29, 1945 (U.S.N.M. no. 603671); Abuyog, eastern Leyte Island, R. T. Abbott, legit, August 14, 1945 (U.S.N.M. no. 603672).

Ecology and habits.—These mollusks are very active but shy creatures and were collected in three estuarine localities on Leyte Island. At the type locality they were found in 6-inch-deep, stagnant, brackish-water pools under the shade of floating palm fronds. The bottom was black ooze. *Syncera* and *Neritina ziczac* Linnaeus were found in the same neighborhood. At San Joaquin they were found under similar conditions where the water temperature was 81° F. and the pH 7.6. Several species of *Syncera*, a *Cerithidea*, and *Clenchiella victoriae* Abbott, 1948, were collected with them. These *Stenothyra* are rapid crawlers. At the slightest disturbance they snap back into their shells with remarkable speed.

Remarks.—The only other described species of *Stenothyra* in the Philippines that possesses spiral rows of pits is *S. quadrasi* Moellendorff, 1895, which, however, is a much larger shell (7 mm in length), much thicker, with a very thick, flattened, and spirally lirated base, and with distinctly angled early whorls. *S. austini* apparently has a wide range throughout the Philippines but appears to be broken up into geographical, insular races or subspecies. We have a single specimen from Bacoor Bay, Luzon (U.S.N.M. no. 603674), but we hesitate to describe it as a new race until additional material is at hand.

Stenothyra austini clarki, n. subsp.

Fig. 2

Shell similar to *S. austini austini* but differing in having deeper and larger pits and in having the spiral rows evenly spaced. In *austini* there are often three or four rows missing. The shells of our specimens of *S. austini clarki* are reddish brown in color, but this may be due to ecological conditions. Holotype: Length, 3.4; width, 1.9 mm.

Type locality.—The holotype, U.S.N.M. no. 603673, is from Manglares, between Bacoy and Calapan, Mindoro Island, Republic of the Philippines. J. F. Quadras, legit, circa 1880. Two paratypes from the same locality, U.S.N.M. no. 303387, are probably from the same collector.

The difference in shape between these subspecies, as seen in Figs. 1*a* and 2, is not specifically significant. Some specimens of *austini* are similar to those of *clarki* in shape and size.

MALACOLOGY.—*Two new Western Atlantic species of pulmonate mollusks of the genus* Detracia *and two old ones (family Ellobiidae).*[1]

J. P. E. MORRISON, U. S. National Museum.

The molluscan genus *Detracia* Gray, 1840, is represented in the Western Atlantic region by four known species. They divide evenly: Two have been previously named; two are new. Two are continental; two are island species in their geographic distribution.

I wish to thank particularly Dr. H. A. Pilsbry and the authorities of the Academy of Natural Sciences of Philadelphia for the opportunity to borrow freely and study all specimens of this genus in the Academy collections. Without such study of many specimens additional to those in the United States National Museum collections, the zoogeographic picture here presented could not have been so complete.

Detracia floridana (Pfeiffer), 1856

Figs. 4, 7

This manuscript name of Shuttleworth was first validly published in Pfeiffer's *Monograph auriculaceorum*, p. 35, no. 35, 1856. W. G. Binney, the first subsequent American author to study the group, unfortunately selected the wrong specimen for figuring in 1859 in his *Terrestrial mollusks of the United States* **4:** pl. 75, fig. 30, from the mixture of species brought back from the Florida Keys by Bartlett for his father, Amos Binney. This figure represents the smallest (dwarf) form of *Melampus bidentatus* Say we know from the Florida Keys, instead of *floridana*.

Because every succeeding illustrator of the group has copied this earliest figure of Binney, this species, the only one of the family confined to United States shores, has, up to the present time, almost a century later, not yet been figured! The presence in the literature of an incorrect figure makes the generic confusion that has so long surrounded this species easy to understand.

D. floridana may be easily distinguished by its small size and, even in the youngest individuals seen (1.5 mm long), by the more regularly biconic shape. The aperture is markedly constricted below (anteriorly) by the columellar lamella. There is a single palatal lamella, which is horizontal and approximately equal in height to the columellar. Between these two the palatal wall is well rounded and usually heavily calloused. The parietal wall is usually furnished with about 10 subequal, low lamellae, as in most species of the genus *Melampus*. These minute lamellae are sometimes present posteriorly along almost the full length of the parietal wall. In many young specimens their inner extensions are visible through the translucent penultimate whorl.

The specimens figured (U.S.N.M. no. 473892) are part of a lot collected on August 26, 1938, from the salt marsh at Chesapeake Beach, Calvert County, Md.

The adult (Fig. 7) has 10^2 whorls and measures: Height 7.9 mm; diameter 4.8 mm; aperture height 5.8 mm; aperture diameter 2.2 mm. The younger individual (Fig. 4) has 11 whorls and measures: Height 6.6 mm; diameter 3.6 mm; aperture height 4.5 mm; aperture diameter 1.9 mm.

D. floridana is entirely continental in geographic distribution. It is recorded only from Delaware and Chesapeake Bays, east and west Florida, and the Gulf coast of Alabama, Mississippi, and Louisiana. The present lack of locality records from the Carolinas and Georgia is probably due to the fact that no collecting has been done in the transitional estuarine (freshwater–brackish–salt) marshes of those coastal areas. In the Chesapeake Bay area, where it is perhaps now best known, it seems to prefer or tolerate a lower degree of salinity in the salt-marsh habitats than does its neighbor and relative *Melampus bidentatus lineatus* Say. Under estuarine conditions this species is sometimes astoundingly abundant. With an observed concentration of more than one individual per square inch, it was estimated on June 28, 1950, that in just 1 square mile of the estuary marshes of the Pocomoke River (Accomack County, Va.) there were twice as many individuals of *Detracia floridana* as there are human beings in the entire world. In other words, more than 4 billion of these small snails inhabit this one particular square mile!

[1] Published by permission of the Secretary of the Smithsonian Institution. Received October 6, 1950.

[2] Apex eroded. Number of whorls indistinct.

Detracia clarki, n. sp.

Figs. 2, 6

Shell large (for the genus), obovate, smoothish, of 10–12 whorls, with moderate spire somewhat variable in height but usually about one-third the height of the aperture. Body whorl tending to be subcylindrical, smoothly sculptured with minute growth lines only, except for a few incised spiral lines above the shoulder and near the base. Aperture sublinear, conspicuously obstructed by two heavy, upturned (posteriorly dished) axial lamellae, which are continuous from the plane of the aperture to about three-fourths of a whorl within. The columellar, the most prominent of the two, usually extends more than halfway across the aperture to the parietal wall. The outer lip (parietal wall) bears a variable number (a few) of well-spaced lamellae essentially alternating with the axials basally (anteriorly). In addition, the aperture of adults shows a greater number of low parietal lamellae interpolated on an internal ridge or varix along the parietal wall, behind which ridge the parietal lamellae are much reduced in height and prominence.

The holotype U.S.N.M. no. 594588 (Fig. 6), has 11 whorls and measures: Height 12.5 mm; diameter 6.7 mm; aperture height 9.8 mm; aperture diameter 3.2 mm. It and 14 paratypes, U.S.N.M. no. 36062, were collected at Key West, Fla., by Henry Hemphill previous to 1884. It is not absolutely certain that these specimens were taken on Key West, as the older custom was to give general localities only. They may have come from either Stock Island or Boca Chica Key nearby, where it seems evident the species is still living. The younger specimen (Fig. 2) (U.S.N.M. no. 594589) comes from Stock Island, Fla. It has 10 whorls and measures: Height 6.5 mm; diameter 4.0 mm; aperture height 4.7 mm; aperture diameter 2.3 mm.

The geographic distribution as recorded for the 532 specimens at hand includes the Bahamas (?), the Florida Keys, and Cuba, as follows: BAHAMAS: 1 specimen (U.S.N.M. no. 594592) from Great Abaco Island, perhaps drifted to this locality. FLORIDA: "Miami" (S. N. Rhoads, 1899); a key near Chokoloskee; Virginia Key (Biscayne Bay); Pumpkin Key (Card Sound); Middle Key (Barnes Sound); Tavenier Key and Key Largo; from Indian, Lower Matecumbe, Bahia Honda, New Found Harbor, Windley's, Torch, Geiger's, Sugar Loaf, Big Pine, and Boca Chica Keys; Stock Island; and Key West. An old record of "St. Augustine" is doubtful, except as a possible drift specimen. CUBA: Recorded at present from only two widely separate localities: Punta Cajon, Pinar del Río (U.S.N.M. no. 492571), and Cayo Perro, Cardenas Bay (U.S.N.M. no. 594590). In other words, *Detracia clarki* is at present known only from a restricted area in the Western Atlantic along the Straits of Florida.

Of the size and general shape of *Melampus bidentatus bidentatus* Say, with which it occurs, and *Pira monile* Bruguière, *D. clarki* is readily distinguished on apertural characteristics. The extra-heavy columellar lamella, higher than the palatal, and by far the most prominent of the aperture, reaching nearly to the parietal wall in some individuals, is turned upward within, to form a cup-shape structure whose rim approaches a parallel to the columellar axis. This extreme constriction of the basal part of the aperture by the columellar lamella will separate it from *Melampus bidentatus*, while the absence of cuticular setae or the remaining scar-pits of the same on the spire will easily separate it from *Pira monile*. *D. clarki* is distinct from all others by the conspicuously posteriorly dished or upcurved direction of the columellar lamella. It is twice the size, when adult, of any other known member of the genus *Detracia*.

This species is named in honor of Austin H. Clark, retiring curator of echinoderms of the United States National Museum, in some small recognition of his outstanding faculty for inspiring others in the solution of problems of the zoogeography of invertebrate animals of all types from every corner of the world.

Detracia bullaoides (Montagu), 1808

Figs. 1, 5

This the genotype species was first described from shells recovered from ballast discarded along the coast of England. For many years, however, it has been well known as a characteristic species of the West Indies. It is figured here to complete the picture of West Atlantic forms, so that future students will not have to search elsewhere for comparable illustrations.

D. bullaoides is easily distinguished by the more elongate shape of most adults, as well as by the heavily buttressed palatal lamella. The few low parietal lamellae are present only on the basal (anterior) portion of the parietal or outer

wall of the aperture. In most adult shells the aperture is posteriorly exceedingly narrow and linear.

The adult specimen, U.S.N.M. no. 466289 (Fig. 5), has 12 whorls and measures: Height 9.5 mm; diameter 4.3 mm; aperture height 5.6 mm; aperture diameter 2.2 mm. It is one of many specimens collected on the edge of the mangrove swamp on Shell Key, off St. Petersburg, Fla., April 24, 1936. The younger specimen (Fig. 1) has 10 whorls and measures: Height 6.2 mm; diameter 3.2 mm; aperture height 4.3 mm; aperture diameter 2.0 mm. It comes from the same lot.

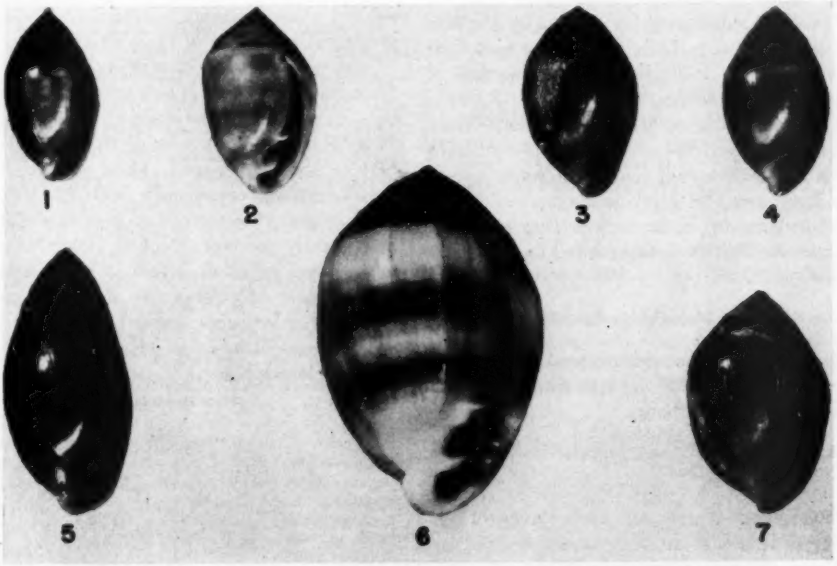
D. bullaoides is apparently primarily Greater Antillean in its geographic range. The United States National Museum collections include specimens from the Bermudas; from Fernandina to Key West and to Cedar Keys, Fla.; the Bahamas; Cuba; Jamaica; and Hispaniola. There are also records of this species in the collections of the Academy of Natural Sciences of Philadelphia from St. Croix, Virgin Islands; and Tampico, Mexico.

Detracia parana, n. sp.

Fig. 3

Shell small, obovate-biconic, smooth, of about 10 whorls. Spire moderate, equal to about one-fourth the total length of the shell. Body whorl well rounded, smoothly sculptured with minute growth lines only, with the very low, rounded shoulder about midway of the shell height. Aperture moderately narrow, constricted by a prominent horizontal or downwardly (anteriorly) directed columellar lamella, which extends forward to be continuous with the base of the outer lip. The palatal wall is furnished with a single low horizontal lamella a little below the middle of the aperture. This is inconspicuous and in specimens seen extends only about one-fourth of the way to the parietal wall. The parietal wall is not furnished with lamellae but appears smooth.

The holotype, U.S.N.M. no. 594591 (Fig. 3), and three paratypes, U.S.N.M. no. 32090, were collected from the Amazon River at Pará, Brazil, by J. B. Steere, previous to 1885, when they were catalogued at the United States National



FIGS. 1, 5.—*Detracia bullaoides* (Montagu), young and adult, U.S.N M. no. 466289, from margin of mangroves on Shell Key, off St. Petersburg, Fla., April 24, 1936, J. P. E. Morrison.

FIG. 2.—*Detracia clarki*, n. sp., young paratype, U.S.N.M. No. 594589, from Stock Island, Fla., P. Bartsch.

FIG. 3.—*Detracia parana*, n. sp., holotype, U.S.N.M. no. 594591, from the Amazon River, Pará, Brazil, J. B. Steere.

FIGS. 4, 7.—*Detracia floridana* (Pfeiffer), young and adult, U.S.N.M. no. 473892, around grass roots in salt marsh at Chesapeake Beach, Md., August 26, 1938, J. P. E. Morrison.

FIG. 6.—*Detracia clarki*, n. sp., holotype, U.S.N.M. no. 594588, Key West, Fla., H. Hemphill.

Museum. The holotype has 10[3] whorls and measures: Height 6.8 mm; diameter 3.9 mm; aperture height 5.2 mm; aperture diameter 2.0 mm.

This new species is almost exactly like the North American continental species *floridana* in general appearance but differs considerably in the detail of lamination of the aperture. It lacks any marked callosity of the aperture above the columellar lamella. The columellar wall below (anterior to) the palatal lamella is rather flat, not markedly arched and calloused in this region as it is in *floridana*. Though the number of specimens of *parana* at hand is very small, the observed differences, together with the observed similarities, of a molluscan species purporting to come from an absolutely comparable estuarine habitat on South American West Atlantic shores lead me to advance *Detracia parana* as a species that has developed completely parallel to its close relative *D. floridana* of North America.

[3] Apex eroded. Number of whorls indistinct.

MALACOLOGY.—*A new species of glycymerid from the Philippines.*[1] DAVID NICOL, U. S. National Museum.

This is a report on a new species of glycymerid collected by the U. S. Fish Commission steamer *Albatross* on the Philippine expedition of the years 1907 to 1910. It is my intention to give a complete account of the Glycymeridae of this collection at a later date.

Genus **Axinactis** Mörch, 1861

Genotype (subsequent designation by Hertlein and Strong, 1943, p. 153): *Pectunculus inaequalis* G. B. Sowerby, 1833; Recent; Pacific coast of Panama and Nicaragua.

Axinactis is the earliest generic name available for the raised-ribbed species of glycymerids, which are nearly always confined to warm waters. This large group of glycymerids has had an independent history as far back as Oligocene time and is certainly not closely related to *Glycymeris glycymeris* (Linné).

Subgenus **Melaxinaea** Iredale, 1930

Genotype (original designation): *Melaxinaea labyrintha* Iredale, 1930; Recent; Albany Passage, Queensland, 9–12 fathoms.

Axinactis (Melaxinaea) clarki Nicol, n. sp.

Figs. 1–3

Description.—Valves compressed, ratio of convexity to height about 0.50; dorsal margin long and straight giving shell an eared appearance, anterior, ventral, and posterior margins rounded; light reddish-brown spots on ribs, interior usually colorless, occasionally reddish-brown spots on margins; beaks contiguous, orthogyrate; umbos flat and inconspicuous, located approximately at center of dorsal margin; ligament narrow and elongate, made up of four or five chevron-shaped parts; hinge teeth 23 to 28 in number, averaging 25, arranged in a broad arch on a large flat hinge plate, teeth tending to disappear at center of hinge plate in mature specimens; crenulations on interior ventral border well-marked, usually pointed at end, though sometimes rounded, depressed at center, 15 to 21 in number, averaging 17, not divided as is common in some species of *Melaxinaea*; adductor muscle scars approximately equal in size; radial ribs raised but not prominent, 24 to 28 in number, averaging 26, ribs on central part of shell flat-topped, often with a shallow central groove, occasionally with two or three small ridges; at either end of shell ribs split into fine, slightly nodulose, crooked, riblets, occasionally a small radial rib added in interspaces, the latter almost as wide as ribs at ventral margin; ribs and interspaces crossed by fine, closely spaced, concentric striae which are more prominent on interspaces.

Measurements in mm

Specimen	*Leng*	*Height*	*Convexity of both valves*
Holotype 236879	34.6	34.0	18.1
Paratype 293039	20.6	20.0	10.0
Paratype 293039a	17.0	16.8	8.0
Paratype 293039b	17.0	16.6	8.4
Paratype 293039c	16.4	16.4	8.6
Paratype 293039d	15.9	15.8	7.8
Paratype 293039e	15.0	14.4	7.8
Paratype 293039f	15.4	15.4	7.6
Paratype 293039g	11.6	12.3	6.4

Type specimens.—The holotype and paratypes are in the collection of the U. S. National Museum, Division of Mollusks: Holotype no. 236879, paratypes nos. 293039 and 296058. Thirty-nine

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specimens of the species were studied, but only the holotype is a mature shell. Many of the remainder, however, show the adult rib character and outline of the valves.

Locality data.—Station 5192, Jilantangan Island between Bantayán Island and the northwest end of Cebu (E., N. 13°W., 3 miles 11°09′15″N., 123°50′E.), 32 fathoms, green sand. Station 5277, Malavatuan Island, Lubang Islands northwest of Mindoro (N., S. 56°E., 8 miles 13°56′55″N., 120°13′45″E.), 80 fathoms, fine sand.

Comparisons.—*Axinactis* (*Melaxinaea*) *clarki* most nearly resembles *Pectunculus maskatensis* Melvill, 1897, from Maskat, on the Gulf of Oman. The latter species has larger and more prominent ribs and greater length in comparison to its height. *Pectunculus vitreus* Lamarck has a more angular arrangement of teeth and beaded or granulose ribs. *Pectunculus nova-guineensis* Angas has nodulose ribs and a shorter dorsal margin than *Axinactis* (*Melaxinaea*) *clarki*. *Melaxinaea labyrintha* Iredale, the genotype of *Melaxinaea*, is from Albany Passage, Queensland. It has nodulose ribs that are more numerous, narrower, and more closely spaced on the adult shells. *Melaxinaea litoralis* Iredale from Townsville, Queensland, has a more rounded outline and has finer and more numerous radial ribs. *Glycymeris planiuscula* Chapman and Singleton from the Pliocene of Australia has more closely spaced rounded ribs. *Glycymeris uziniensis* Cox from the Pliocene of Zanzibar has tuberculated ribs and a rounded or subtrigonal outline.

Glycymeris dautzenbergi Prashad (1932, pp. 65, 66) is a homonym of *Pectunculus dautzenbergi* Gregorio (1892, p. 109). *Glycymeris dautzenbergi* Prashad is herewith renamed *Glycymeris prashadi*. This species from the Arafura Sea has nodulose ribs on all of the shell and a shorter dorsal margin than *Axinactis* (*Melaxinaea*) *clarki*.

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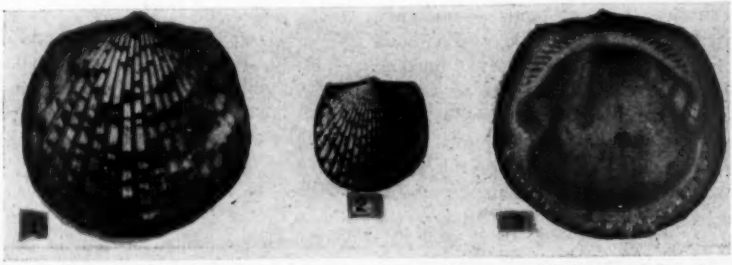

FIGS. 1–3.—*Axinactis* (*Melaxinaea*) *clarki*, n. sp.: 1, Exterior view of holotype, left valve, U.S.N.M. no. 236879; 2, exterior view of paratype (young specimen), left valve, U.S.N.M. no. 293039a; 3, interior view of holotype, left valve, U.S.N.M. no. 236879. All figures natural size.

MALACOLOGY.—*Two new Recent cone shells from the Western Atlantic (Conidae).*[1]

HARALD A. REHDER and R. TUCKER ABBOTT, U. S. National Museum.

Two species of the genus *Conus* were received by the United States National Museum a few years ago from two dredging expeditions off southeastern United States. It appears that both species are undescribed, and we take pleasure in naming them for Austin H. Clark, retiring curator of echinoderms, United States National Museum. The first of these species, collected by the U. S. Fish and Wildlife Service trawler *Pelican* in 1938, is strikingly different from any known Recent species in the Western Atlantic. The second, dredged off southern Florida by the *Anton Dohrn*, is somewhat like the well-known species *Conus stimpsoni* Dall.

Conus clarki, n. sp.

Figs. 1-6

Description.—Shell 36 mm (1⅖ inches) in length, relatively heavy, broadly fusiform, strongly spirally sculptured, and chalk-white in color. Whorls 12, the last whorl with a beaded carina at the shoulder, rounded at the periphery, and concave toward the base. Spire extended, pointed, concave, and slightly more than one-third of the entire length of the shell. Angle of spire about 70°. Nuclear whorls 1½, glassy-smooth. Aperture oblique, long and narrow, with a deep, rounded sinus at the top. Outer lip sharp, thin, and weakly crenulated. The lip is sinuate with the middle portion being advanced, and the lower portion retracted enough to make the end of the siphonal canal considerably open. Spiral scultpure consists of 27 to 30 very strong, raised, squarish, and beaded cords. The topmost spiral cord bears the largest beads, which in previous whorls may be seen just above the impressed wavy sutural line. The surface of these beads is obliquely scratched by fine irregular lines. Top of the whorls slightly concave and with three to five unequal fine spiral threads. Axial sculpture consists of numerous fine, sharply raised, arched threads which cross the spiral threads on the tops of the whorls (anal fasciole). Color of shell chalk-white. In one paratype specimen there are very weak reddish squares of color between the beads on the spiral cords. Periostracum thin, deciduous, light brown, and axially striate.

Animal (Figs. 1–5) typical of the genus *Conus*, with a rather long siphonal extension of the mantle, which is flecked with fine black striations. Side of foot suffused with gray along the lower border. Verge large, 7 mm in length, shaped like a meat cleaver, with a slender, curved point at the end. Verge has fused lamellations on its sides and base. Poison gland and radular sheath typical of the genus. About 30 harpoonlike teeth were found in the sheath. Tooth short with one small barb at the end, two on the side and one at the base (see Fig. 3).

MEASUREMENTS (MM)

Length	*Width*	*Number of Whorls*
36.0	16.0	11.0 (holotype)
36.0	16.0	11.0 (paratype male)
34.4	15.5	10.8

Types.—The holotype is U.S.N.M. no. 485740; one paratype, U.S.N.M. no. 488465; and another paratype is in the Museum of Comparative Zoology.

Type locality.—50 miles south-southwest of Marsh Island, Iberia County, La. (lat. 28° 27.0′N.; long. 92° 14.0′W.). Dredged by the U. S. Fish and Wildlife Service trawler *Pelican*, station 94-1, November 13, 1938, in 29 fathoms.

Range.—Known only from the type locality.

Remarks.—There is no living species described from the Western Atlantic that approximates *C. clarki* in the characters of heavy, raised, square, spiral cords, rounded periphery, attenuated basal portion (giving it a turniplike shape) and the prominent sharp axial, striae between the spiral cords. It is nearest in characters to the middle Miocene fossil *Conus* (*Leptoconus*) *multiliratus* Böse, 1906, from Tuxtepec, Oaxaca, Mexico, and its subspecies *gaza* Johnson and Pilsbry, 1911, from the Dominican Republic, Jamaica, Panama, and Colombia. However, the Recent *C. clarki* is much more turnip-shaped, and its cords at the shoulder of the whorl are strongly beaded.

Conus austini, n. sp.

Fig. 7

Description.—Shell 56 mm in length, heavy, spirally sculptured, and dull-white in color. Whorls 14, almost straight-sided, but very slightly

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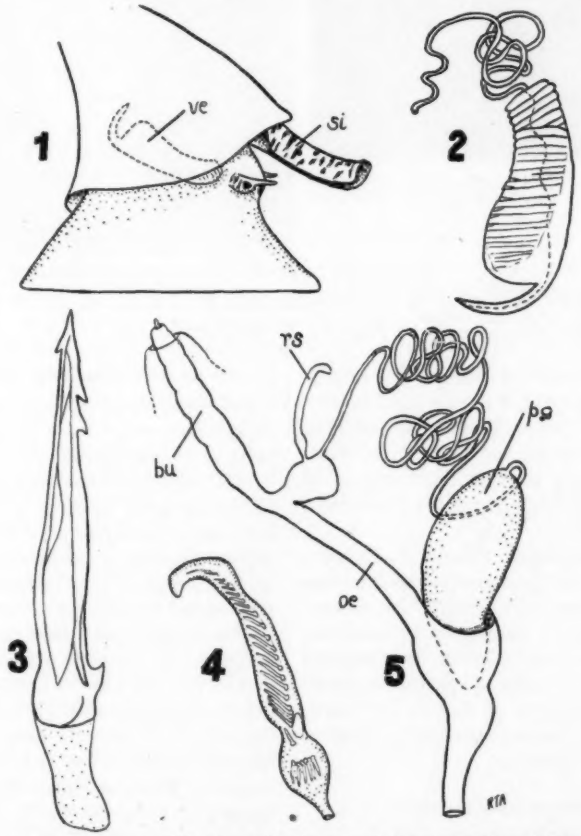
concave toward the base. Shoulders of whorl slightly rounded in adults but carinate in younger specimens. Spire extended, pointed, slightly concave, and about one-quarter the entire length of the shell. Angle of spire about 80°. Nuclear whorls 1¼, glassy-smooth. Next five whorls sculptured by a single, beaded carina, which in the succeeding whorls becomes smooth and located just above the suture. Aperture oblique, long and narrow, with a deep, rounded sinus at the top. Outer lip thin, sharp, and weakly crenulate. Spiral sculpture consisting of about 40 fairly well-developed, irregularly sized, rounded cords, which become more prominent basally. Three to five low, weak, spiral threads present on the top of the whorls, which are obliquely crossed by the arched growth lines of the anal sinus. There is a tendency in some specimens to produce alternately small and large cords. Between the cords the axial sculpture consists of fine, distinct, raised striae. Periostracum moderately thick, when dry becoming axially striate and light brownish yellow in color. Animal and operculum unknown.

MEASUREMENTS (MM)

Length	*Width*	*Number of Whorls*	
55.5	25.3	14	(holotype Tortugas)
43.1	22.0	13	(paratype, Tortugas)
51.0	25.5	13	(paratype, Antigua)

Types.—The holotype is U.S.N.M. no. 603017; a paratype from the same dredging haul, U.S. N.M. no. 421721; a third paratype, U.S.N.M. no.



FIGS. 1–5.—*Conus clarki*, n. sp.: 1, Side view of male animal showing siphon (*si*) and position of verge (*ve*) (×3); 2, side view of verge and vas deferens (×10); 3, single tooth (×50); 4, radular sac showing arrangement of unused teeth (×25); 5, semidiagrammatic drawing of anterior alimentary system and poison apparatus, *bu*, buccal mass; *rs*, radular sac; *pg*, poison gland (×15).

603018, was dredged by the *Eolis, Jr.* by J. B. Henderson at the entrance of English Harbour, Antigua, Lesser Antilles, June 21, 1918.

Type locality.—Southeast of Loggerhead Key, Dry Tortugas, Florida. Dredged in 40 to 46 fathoms by W. L. Schmitt from the *Anton Dohrn*, June 21, 1932.

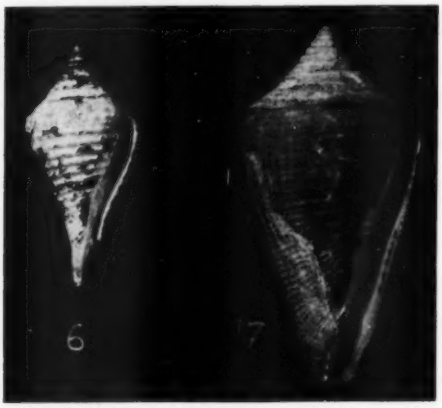


FIG. 6.—*Conus clarki*, n. sp., holotype. FIG. 7.—*Conus austini*, n. sp., holotype. (Both natural size.)

Range.—From Dry Tortugas, Fla., south to Antigua Island, Lesser Antilles.

Remarks.—This species is similar to *C. stimpsoni* Dall but differs in being larger, having raised spiral cords instead of incised grooves, having numerous fine but distinct axial striae between the cords, and lacking any color markings. A young specimen of *C. austini* displays a number of axial wrinkles in the middle of the body whorl, a variable character common to some Miocene fossil species.

A similar species exists in the Gurabo formation, Dominican Republic (Miocene). Specimens of this fossil are in the U. S. National Museum, mixed in with lots labeled *C. planiliratus* Sowerby. It is apparently undescribed and differs from the Recent *C. austini* in having a slightly shorter spire, being half as high and rarely showing the tiny, angled keel on the shoulder of the whorls in the spire. Otherwise the shape and sculpture are extremely similar. *C. stenostoma* Sowerby, a Miocene fossil from the Domican Republic, is also very close but has a very low spire and a sharper shoulder.

MALACOLOGY.—*A new scaphopod mollusk*, Cadulus austinclarki, *from the Gulf of California.*[1] WILLIAM K. EMERSON, Research Fellow, Allan Hancock Foundation. (Communicated by Harald A. Rehder.)

A recent visit to the United States National Museum provided me an opportunity to examine the Scaphopoda contained in the vast collection of the division of mollusks. A previously unrecognized species of *Cadulus* from the Gulf of California is here described.

I am indebted to Dr. Harald A. Rehder, curator of mollusks, for access to the facilities of the division, and to Frederick M. Bayer, assistant curator of marine invertebrates, for providing the camera-lucida drawing and the photograph. I take pleasure in dedicating this new species to Austin H. Clark, retiring curator of echinoderms in the United States National Museum.

Family SIPHONODENTALIIDAE

Genus **Cadulus** Philippi, 1844

Genotype (by monotypy): *Dentalium ovulum* Philippi, 1844, Recent; Mediterranean Sea.

Subgenus **Platyschides** Henderson, 1920

Subgenotype (by original designation): *Cadulus grandis* Verrill, 1884; Recent, West Atlantic, north of Cape Hatteras.

Shell small to relatively large, moderately curved, greatest swelling between the middle and oral aperture, posterior portion and aperture slightly flattened dorsoventrally; surface without sculpture, smooth and polished; apex possessing four rather broad, but shallow notches; white.

This group differs from the subgenus *Polyschides* in having the apical notches greatly reduced. The slits vary in size from small indentations, which appear as chipped-out portions of the margin, to minute features requiring considerable magnification in order to ascertain the structure. There are many Recent and Tertiary species.

Cadulus (Platyschides) austinclarki, n. sp.
Figs. 1, 2

Shell is minute, fairly solid, vitreous, semitransparent, very slender, moderately curved,

[1] Received October 6, 1950.

FIG. 1.—*Cadulus* (*Platyschides*) *austinclarki*, n. sp.: Holotype, approximately ×20.

with the greatest diameter approximately two-fifths the distance from the oral aperture. The swelling is gradual and approaches uniformity, the equator not being conspicuously bulbular and the convex face forming a nearly uninterrupted arc. The outline of the concave side is very regular except for the area of slight equatorial swelling. The oral (anterior) aperture is constricted, slightly compressed dorsoventrally, but nearly circular in section; apertural margin is slightly oblique. Apex is not much attenuated, relatively large, circular in outline, with a rather oblique margin. The apical characters are minute but well defined. The apex has four shallow notches separated by as many lobes of nearly equal size. The slits are subtriangular in shape, very shallow, with concave pair slightly deeper; the lobes are subconical, with the greatest height of the lobe composed of the inner shell layer, the outer margin being beveled so as to provide a thin edge to the lobes (Fig. 2). The prominence of the lobes varies with individuals. In some specimens the vitreous shell is clouded by semiopaque circular zones producing alternate rings of more or less translucency.

Measurements.—Holotype, 4.4 mm long; diameter of apical orifice 0.35 mm; apertural diameter 0.55 mm. None of the paratypes measures more than 5 mm in length.

Remarks.—The extremely small size, narrowness, and distinctive apical characters serve to distinguish this species from all other Eastern Pacific forms. No living species thus far described from the Eastern Pacific approaches this species. The most similar living species appears to be *Cadulus* (*Platyschides*) *nitidus* Henderson (1920) from Mayagüez Harbor, Puerto Rico, in 25 fathoms. Though this West Atlantic species has similar apical features, it is longer and more attenuated and possesses even less equatorial swelling than *Cadulus austinclarki*. *Cadulus* (*Platyschides*) *parvus* Henderson (1920) from the Florida keys and off Barbados possesses nearly the same general outline but has a longer shell with more prominent apical features. *Cadulus* (*Platyschides*) *amiantus* Dall (1889) from off Bahia Honda, Cuba, is a larger more curved species with a greater equator. *Cadulus* (*Platyschides*) *miamiensis* Henderson (1920) from off Fowey Light, Fla., in 209 fathoms, is a much larger, more curved species with entirely different apical characters.

The National Museum records indicate that this new species is limited to the warm waters of the Panamic province. This is the first representative of the subgenus *Platyschides* reported from the Eastern Pacific region. Intensified collecting in this area will undoubtedly reveal the presence of other species belonging to this group.

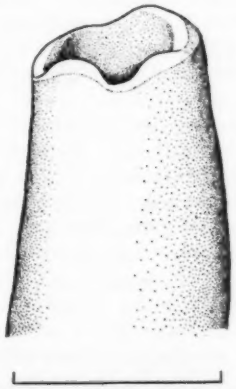


FIG. 2.—*Cadulus* (*Platyschides*) *austinclarki*, n. sp.: Holotype, apical features greatly magnified, a ¾-oblique view with the concave face on the left side: line represents 0.5 mm.

Type locality.—Santa Inez Bay, Baja California (Gulf of California), west around Santa Inez Point, dredged in 6–12 feet of water in fine black sand; J. Hawkins, Jr., collector, March 30, 1940.

Range.—Santa María Bay, lat. 24°45′W, west coast of Baja California, Mexico (in Gulf of California: Santa Inez Bay, 27°N), to Panama City, lat. 8°50′N., and the Galápagos Islands, 1°N.

Types.—Holotype: U.S.N.M. no. 564527. Paratypes: 39 in number, U.S.N.M. no. 602347.

Records (latitudinal data approximate).—

West Coast of Baja California, Mexico

Santa María Bay, 24° 45′ N., boat dredge, Bartsch (8).

Cape San Lucas, Bartsch (1).

East Coast of Baja California, Mexico

Fraile Bay, 23° 23′ N., 10–30 feet, coarse, gray sand, Hawkins (5).

Pichilinque Bay, 24° 13′N., Bartsch (18); 24° 13′N., 20–30 feet, Hawkins (2).

La Paz Bay, 24° 15′N., all Hawkins: Between La Paz and El Mogote, 4–6 feet, on gray sandbar (2); north of east end of El Mogote, 1 fm., black sand (2); east point of El Mogote, low tide on sandy beach (dead) (4); ½ mile southeast of Prieta Point, 2 fms., gray sand (1); 2½ miles north of La Paz, 1–2 fms., on bar off Caruanito Rock, gray sand (1).

San Carlos Bay, 25° 18′N., 2–3 fms., fine black sand bottom, Hawkins (1).

Conception Bay, west end of Coyote Bay, 26° 53′N., 10–12 feet in cove, Hawkins (1).

Santa Inez Bay, 27° N., Hawkins: 2 miles west of Santa Inez Point, 4½ fms., ½ mile offshore in coarse gray sand (6); west around Santa Inez Point, 6–12 feet in cove, fine black sand (40), types.

Republic of Panama

Panama City, 8° 50′N., Zetek (5).

Panama, Zetek (9) [tips broken].

Galápagos Islands

Near Galápagos Islands, 1° 21′N., 89° 40′W., U.S.F.C. 2813, 40 fms. (25±) [tips broken].

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ZOOLOGY.—*The brittle-stars of the United States Navy Antarctic Expedition 1947–48.*[1] AUSTIN H. CLARK, U. S. National Museum.

In a previous article (this JOURNAL, **40:** 335–337, 1950) the Crinoidea, Echinoidea, and Asteroidea of the Navy's Antarctic Expedition of 1947–48 were described. The collection includes 11 species of Ophiuroidea, none of them new although several are of much interest.

The literature on the Antarctic echinoderms has recently been brought up to date by the magnificent series of *Discovery* reports based upon the work of the *Discovery, Discovery II*, and *William Scoresby* from 1925 to 1935. In this series the report on the Echinoidea and Ophiuroidea by Th. Mortensen was published in 1936; on the Crinoidea (with bibliography) by D. Dilwyn John in 1938; and on the Asteroidea (with bibliography) by Walter K. Fisher in 1940.

A detailed account of the faunal relations of the Asteroidea, Ophiuroidea, and Echinoidea was published by René Koehler in 1912 (Deuxième Expédition Antarctique Française, 1908–1910, Échinodermes, pp. 186–253), and of the Crinoidea by the present author in 1915 (Die Crinoïden der Antarktis).

OPHIUROIDEA

OPHIACANTHIDAE

Ophicantha disjuncta (Koehler)

Ophiodiplax disjuncta Koehler, British Antarctic Expedition 1907–9, **2,** Biology, pt. 4: 48, pl. 6, figs. 9, 10, 11, pl. 7, fig. 13. 1911.

Localities.—Lat. 66° 35′ S., long. 90° 40′ E.; 150 fathoms; water temperature (surface) 29° F.; December 30, 1947 (1 specimen, U.S.N.M. no. E.7689).

Marguerite Bay; 35 fathoms; water temper-

[1] Published by permission of the Secretary of the Smithsonian Institution. Received September 5, 1950.

ature 30° F.; February 20, 1948 (1 specimen, U.S.N.M. no. E.7690).

Notes.—In the specimen from lat. 66° 35′ S., long. 90° 40′ E. the disk is 12 mm in diameter and the arms are 80 mm long. In the specimen from Marguerite Bay in 35 fathoms the disk is 7 mm in diameter; the arms are 35 mm long.

AMPHIURIDAE

Amphiura algida Koehler

Amphiura algida Koehler, British Antarctic Expedition 1907–9, **2**, Biology, pt. 4: 46, pl. 7, figs. 14, 15. 1911.

Locality.—Off Cape Royds, Ross Island; 58 fathoms; January 29, 1948 (20 specimens, U.S.N.M. nos. E.7687, E.7688).

Notes.—In the largest specimens the disk is 5 mm in diameter and the arms are 25 mm long. The radial shields are in contact from only at their outer ends to about their whole length, and are slightly broader than is shown in Koehler's figure. The arm spines at the base of the arms are 5, sometimes 6.

Amphiura belgicae Koehler

Amphiura belgicae Koehler, Resultats du voyage de S. Y. *Belgica* en 1897 1898–1899, Rapports Scientifique, Zoologie, Échinides et Ophiures: 27, pl. 7, figs. 46–48. 1901.

Localities.—Off Cape Royds, Ross Island; 58 fathoms; January 29, 1948 (3 specimens, U.S.N.M. no. E.7683).

Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (2 specimens, U.S.N.M. no. E.7682).

Notes.—One of the specimens from off Cape Royds has the disk 8 mm in diameter and the arms 40 mm long. One basal side arm plate has 5 arm spines; the others have 4 spines. The two specimens from Marguerite Bay have the disk 10 mm in diameter and the arms about mm long; the first four side arm plates beyond the disk have 5 arm spines.

OPHIOLEPIDIDAE

Ophiomastus ludwigi Koehler

Figs. 1, 2

Ophiomastus ludwigi Koehler, Resultats du voyage de S. Y. *Belgica* en 1897–1898–1899, Rapports Scientifique, Zoologie, Échinides et Ophiures: 23, pl. 3, fig. 22, pl. 4, figs. 27, 28. 1901.

Locality.—Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (2 specimens, U.S.N.M. no. E.7979).

Notes.—Although there is considerable difference in some details, there can be no doubt that the larger specimen (Fig. 1) represents the same species as the single specimen described as *Ophiomastus ludwigi*, which was dredged near Peter Island (lat. 71° S., long. 88° 02′ W.) in 600 meters.

It is smaller than the type with the disk 3 mm in diameter and the arms 7 mm long and, like the type, is immature without genital slits. The plates of the disk are somewhat irregular. On the first tentacle pore there are three scales on the interradial side, one on the radial; on the second pore there are two or three scales on the outer side, none on the inner; on the four or five following pores there is a single small scale at the base of the lower arm spine; there are no scales on the following pores. There are two arm spines, rather widely spaced.

A smaller specimen (Fig. 2) with the disk 1.7 mm. in diameter and the arms 5 mm long probably belongs to the same species. The primary radial plates are in contact, and portions of the radial shields are visible beyond them, as in Koehler's specimen. As in the larger specimen the disk is thick, but not domed. The first five upper arm plates, which are not in contact and decrease in size outwardly from the disk, are greatly swollen. The arms are more slender than those of the larger specimen with much elongated and narrow side arm plates and very small upper and under arm plates. There are two arm spines and no tentacle scales.

Ophiura serrata Mortensen

Figs. 3, 4

Ophiura serrata Mortensen, *Discovery* Reports **12**, Echinoidea and Ophiuroidea: 334, fig. 47, *a-d*, 335. 1936.

Locality.—Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (2 specimens, U.S.N.M. no. E.7980).

Notes.—These specimens undoubtedly represent the species called *Ophiura serrata* by Mortensen, though they differ from that species as described in having fewer and more regular plates on the dorsal side of the disk and in the ventral interradial areas, in having only two well-separated arm spines, and in lacking any evidence of arm combs, all features presumably due to immaturity.

The upper arm plates are high and roundedly carinate, separated from each other by a conspicuous notch. In the smaller specimen they are

especially high at the arm bases where they are separated by a rather broad V-shaped notch. Distally they become gradually lower and smaller, more and more widely separated, and minute in the distal half of the arm. In lateral view the basal part of the arm appears swollen.

In the larger specimen the disk is 5 mm in diameter and the arms are 13 mm long; in the smaller the disk is 3 mm in diameter and the arms are 10 mm long.

Ophiura rouchi (Koehler)

Ophioglypha rouchi Koehler, Deuxième Expédition Antarctique Française (1908–1910), Échinodermes (Astéries, Ophiures et Échinides): 107, pl. 9, figs. 11, 12. 1912.

Localities.—Off Cape Royds, Ross Island; 58 fathoms; January 29, 1948 (2 very small specimens, U.S.N.M. no. E.7707).

Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (4 specimens, U.S.N.M. no. E.7684).

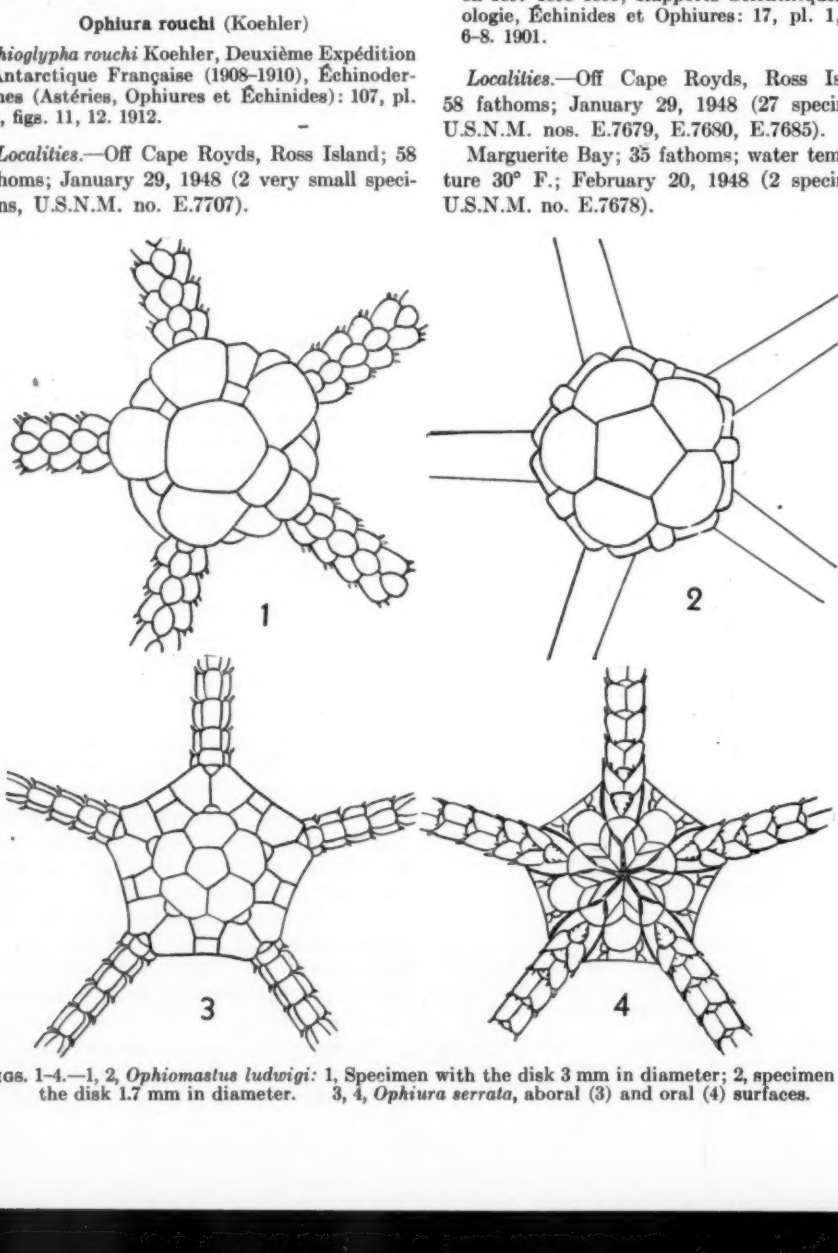
Notes.—The specimens from Marguerite Bay have the disk 5 mm. in diameter and the arms 30 mm. long.

Ophiurolepis gelida (Koehler)

Ophioglypha gelida Koehler, Bull. Acad. Belgique, 1900: 819; Resultats du voyage du S. Y. *Belgica* en 1897–1898–1899, Rapports Scientifiques, Zoologie, Échinides et Ophiures: 17, pl. 1, figs. 6–8. 1901.

Localities.—Off Cape Royds, Ross Island; 58 fathoms; January 29, 1948 (27 specimens, U.S.N.M. nos. E.7679, E.7680, E.7685).

Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (2 specimens, U.S.N.M. no. E.7678).



FIGS. 1–4.—1, 2, *Ophiomastus ludwigi:* 1, Specimen with the disk 3 mm in diameter; 2, specimen with the disk 1.7 mm in diameter. 3, 4, *Ophiura serrata*, aboral (3) and oral (4) surfaces.

Notes.—The largest specimen from off Cape Royds has the disk 11 mm. in diameter and the arms 35 mm long. One specimen is 4-rayed. The largest specimen from Marguerite Bay has the disk 12 mm in diameter and the arms 35 mm long.

Ophiurolepis martensi (Studer)

Ophioglypha martensi Studer, Jahrb. wiss. Anst. Hamburg **2**: p. 161, pl. 2, figs. 8, *a*, *b*. 1885.

Localities.—Off Cape Royds, Ross Island; 58 fathoms; January 29, 1949 (11 specimens, U.S.N.M. nos. E.7705, E.7706).

Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (5 specimens, U.S.N.M. no. E.7704).

Ophionotus victoriae Bell

Ophionotus victoriae Bell, Report Coll. Nat. Hist. . . . *Southern Cross:* 216. 1902.—Koehler, Deuxième Expédition Antarctique Française (1908–1910), Échinodermes (Astéries, Ophiures et Échinides): 114, pl. 10, figs. 2–4, 12, 13, pl. 11, fig. 8. 1912.

Localities.—Lat. 65° 25′ S., long. 101° 13′ E.; 100 fathoms; water temperature 30° F.; January 14, 1948 (10 specimens, U.S.N.M. no. E.7676)

Peter Island; 30 fathoms; water temperature 29.6° F.; February 15, 1948 (124 specimens, U.S.N.M. nos. E. 7658, E.7659, E.7660, E.7663, E.7664, E.7665, E.7666, E.7669, E.7670, E.7671, E.7672, E.7673, E.7674, E.7675).

Peter Island; 60 fathoms; February 15, 1948 (1 specimen, U.S.N.M. no. E.7668).

Marguerite Bay; 35 fathoms; water temperature 30° F.; February 20, 1948 (22 specimens, U.S.N.M. nos. E.7661, E.7662).

Marguerite Bay; 40 fathoms; water temperature 30° F.; February 22, 1948 (8 specimens, U.S.N.M. no. E.7667).

Notes.—The specimens from lat. 65° 25′ S., long. 101° 13′ E. with the disk up to 27 mm in diameter have the disk less rounded and more pentagonal than the others; the arm spines are more slender and delicate and the mouth papillae less stout and more sharply pointed. The arms are longer and more slender, a specimen with the disk 23 mm in diameter having the arms 120 mm long, and one with the disk 16 mm in diameter having the arms 80 mm long.

The specimens from Peter Island in 30 fathoms have the disk from 4 to 25 mm in diameter.

The specimen from Peter Island in 60 fathoms has the disk 20 mm in diameter.

In the specimens from Marguerite Bay in 35 fathoms the disk is up to 27 mm in diameter. One of those from Marguerite Bay in 40 fathoms has the disk 28 mm in diameter.

Ophiosteira senoqui Koehler

Ophiosteira senoqui Koehler, Deuxième Expédition Antarctique Française (1908–1910), Échinodermes (Astéries, Ophiures et Échinides): 110, pl. 10, figs. 8–11. 1912.

Locality.—Off the Knox Coast (lat. 66° 31′ S., long. 110° 26′ E.); 100 fathoms; January 19, 1948 (1 specimen, U.S.N.M. no. E.7681).

Note.—In this specimen the disk is 20 mm. in diameter and the arms are 120 mm long.

Ophiocten megaloplax Koehler

Ophiocten megaloplax Koehler, Bull. Acad. Belgique, 1900: 819; Resultats du voyage du S. Y. *Belgica* en 1897–1898–1899, Zoologie, Échinides et Ophiures: 22, pl. 6, figs. 38, 39. 1901.

Localities.—Lat. 66° 35′ S., long. 90° 40′ E.; 150 fathoms; water temperature (surface) 29° F.; December 30, 1947 (1 specimen, U.S.N.M. no. E.7692).

Lat. 65° 25′ S., long. 101° 13′ E.; 100 fathoms; water temperature 30° F.; January 14, 1948 (2 specimens, U.S.N.M. no. E.7693).

Off the Knox Coast (lat. 66° 31′ S., long. 110° 26′ E.); 100 fathoms; January 19, 1948 (1 specimen, U.S.N.M. no. E.7691).

Notes.—The specimen from lat. 66° 35′ S., long. 90° 40′ E. in 150 fathoms has the disk 5.5 mm in diameter and the arms 25 mm long. The specimen from off the Knox Coast has the disk 8 mm. in diameter, with the circular central plate 3 mm in diameter, and the arms 35 mm long.

Association of Species (Crinoidea, Echinoidea, Asteroidea, and Ophiuroidea)

Ross Island; caught along the beach near Cape Royds; January 29, 1948. *Odontaster validus.*

Off Cape Royds, Ross Island; 58 fathoms; January 29, 1948. *Sterechinus antarcticus, Odontaster validus, Amphiura algida, Amphiura belgicae, Ophiura rouchi, Ophiurolepis gelida, Ophiurolepis martensi*, Amphiurid.

Marguerite Bay; littoral; February 22, 1948. *Labidiaster annulatus.* Tide pools along shore on an island in Marguerite Bay; February 21, 1948. *Sterechinus antarcticus, Acondontaster elongatus, Lysasterias perrieri, Lysasterias joffrei,*

Adelasterias papillosa. Dredged at 35 fathoms; temperature 30° F.; February 20, 1948. *Promachocrinus kerguelensis, Sterechinus antarcticus, Leptychaster magnificus, Psilaster charcoti, Odontaster meridionalis, Odontaster validus, Acodontaster elongatus, Perknaster aurantiacus, Remaster gourdoni, Adelasterias papillosa, Ophiacantha disjuncta, Amphiura belgicae, Ophiomastus ludwigi, Ophiura serrata, Ophiura rouchi, Ophiurolepis gelida, Ophiurolepis martensi, Ophionotus victoriae*. Dredged at 40 fathoms; temperature 30° F.; February 22, 1948. *Promachocrinus kerguelensis, Sterechinus antarcticus, Odontaster validus, Cuenotaster involutus, Lysasterias perrieri, Ophionotus victoriae*. Dredged at 35-105 fathoms; temperature 30.2° F.; February 19, 1948. *Sterechinus antarcticus*. Dredged at 115 fathoms temperature 30.2° F.; February 18, 1949. *Sterechinus antarcticus, Ondontaster validus*.

Off Peter I Island; 30 fathoms; temperature 29.6° F.; February 15, 1948. *Psilaster charcoti, Ophionotus victoriae*. Same, 60 fathoms; February 15, 1948. *Ophionotus victoriae*.

Lat. 66° 35′ S., long. 90° 40′ E.; 150 fathoms; December 30, 1947. *Ophiacantha disjuncta, Ophiocten megaloplax*.

Lat. 65° 25′ S., long. 101° 13′ E.; 110 fathoms; temperature 30° F.; January 14, 1948. *Florometra mawsoni, Ophionotus victoriae, Ophiocten megaloplax*.

Lat. 66° 31′ S., long. 110° 26′ E.; 100 fathoms; January 9, 1948. *Promachocrinus kerguelensis, Ophiosteira senoqui, Ophiocten megaloplax*.

It is interesting to compare the representation of the different classes of echinoderms (exclusive of the holothurians) in the Antarctic and the Arctic. The number of species in each region is as follows:

	Antarctic	*Arctic*
Crinoidea	24	3
Echinoidea	30	2
Asteroidea	114	23
Ophiuroidea	50	12

This enumeration does not include the fauna of the subantarctic islands or the Magellanic region, which support many additional species mostly related to Antarctic types.

The strictly Antarctic species are almost wholly confined to the immediate vicinity of the Antarctic continent, while the majority of the Arctic species range for a greater or lesser distance southward in the north Atlantic, a few also in the north Pacific, and there is an isolated Arctic colony in the very cold water of the eastern part of the Seas of Okhotsk and Japan. A few Antarctic types range northward along the west coast of South and North America. Thus among the crinoids *Ptilocrinus* reaches British Columbia, *Ilycrinus* occurs off southeastern Alaska and westward to the Commander Islands, and *Florometra* extends northward to the Aleutian Islands, and south in the west Pacific to southern Japan.

ZOOLOGY.—*A new genus and species of notodelphyoid copepod from Japan.*[1] PAUL L. ILLG, U. S. National Museum.

In the course of assembling a series of notodelphyoid copepods for revisionary studies, a fruitful source of material has been found in the yet unclassified collections of tunicates in the National Museum. The distinctive form here described has been selected for immediate treatment as a testimonial to the retiring curator of echinoderms, United States National Museum, Austin Hobart Clark. It is considered an appropriate token of Mr. Clark's significant connections with the United States Fish Commission steamer *Albatross*, the collecting vessel, and of his pioneer interest in the zoogeographic features of Japanese waters.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received October 6, 1950.

The generic name here proposed is derived as an anagram of Mr. Clark's given name.

Family NOTODELPHYIDAE

Subfamily NOTODELPHYINAE Schellenberg, 1922

Ustina, n. gen.

The description below of the characters of the genotype and only species, *Ustina clarki*, n. sp., provides the generic definition.

Ustina clarki, n. sp.

Specimens examined.—23 females, 18 males, all adult; from branchial cavities of numerous specimens of a small species of solitary ascidian. *Albatross* station 3698, off Manazuru Zaki, N.8°, W. 4.5 miles, inside Sagami Bay, Honshu Island, Japan, 153 fathoms, May 5, 1900.

Types.—Holotypic female, U.S.N.M. no. 91090; allotypic male no. 91091; paratypes no. 91092; all from the one known collection; scientific name of ascidian host not known.

Description.—FEMALE (Figs. 1, *a–o*): General aspect (Fig. 1, *a*) marked by the heavy chitinization of the body, with resultant characteristic rigidity of the major body units, and, in addition, an extremely notable compression of the metasome. The heavy body cuticle is densely set with perforating conical pores which reach from wide bases to much diminished surface apertures. There seem to be no structures projecting beyond the apertures. The metasome is 5-segmented. The fused cephalothoracic portion includes the somites of all the mouthparts. The segment of the first swimming legs is free and much shorter than the other thoracic segments. The somite of the fourth legs almost equals in bulk the remainder of the metasome by reason of its voluminous dorsal and posterior expansion to accomodate the characteristic incubatorium. The eggs are large and rather few in number. They form a compact mass which somewhat intrudes anteriorly into the third free somite.

The urosome (Fig. 1, *b*) is 5-segmented, some what elongate and cylindrical. The very short somite of the fifth legs is succeeded by three long, subequal segments and a very short, but highly characteristic, terminal segment. The anal somite bears a greatly enlarged ventral projection, pear-shaped in lateral view, wide and faintly bilobed from ventral aspect. This prominence is further marked by a very thick cuticle, densely set with the porelike structures described above. The caudal rami are widely spaced and project ventrolaterally from the sides of the segment.

An axis through the body measures over-all 2.2 mm. The separate lengths of the metasome and urosome, as measured along their major axes, are respectively 1.75 mm and 1.15 mm.

The head (cephalothorax) is triangular in side view. The ventral margin of the notal shield is markedly indented subapically at the point of emergence of the antennular bases. The notum is produced ventrally and posteriorly over the bases of the antennules as a wide-based, roughly triangular rostrum, with rounded apex.

The antennule (Fig. 1, *c*) is 8-segmented and densely setiferous. The base is more or less enveloped by the ample rostrum. The typical posture would appear to be that resulting from a sharp elbow bend of the third segment upon the second. The basal two segments are much the widest, the six distal to the flexure taper gradually to the narrow tip which is about one-seventh the basal width of the first segment. The setation has not been depicted fully in the figure nor was an exact count attempted. All the segments are heavily chitinized and the setae are consistently long, slender and profusely plumose.

The antenna (Fig. 1, *d*) is 3-segmented. The basal segment is much the longest, almost equaling the combined lengths of the distal segments. It bears distally a well-developed, elongate, plumose seta. The two terminal segments are subequal. Segment 2 bears a short slender seta subapically. Segment 3 has the usual stout, curved, tapered hook, articulated on the distal surface. Set in relation to this terminal jointing are 5 setae. More proximally there is a trio of subequal setae which lie closely appressed to the surface. Still more proximal is a short slender seta. The basal segment bears a characteristic marginal row of very long, fine cilia.

The masticatory plate of the mandible (Fig. 1, *e*) is best presented by illustration. The mandibular palp (Fig. 1, *f*) shows some tendency to suppression of the endopodite. Some of the setae are stout, elongate and plumose, but several are reduced to relatively short and slender dimensions. The two segments are subequal. The basal segment bears 4 setae at the distal medial corner. The terminal segment bears 8 setae arranged across the truncate end and along the medial margin. The basipodite bears a relatively small subapical seta. The exopodite is a flattened, rigid plate with no remaining evidence of segmentation other than its 5 graduated, long, plumose setae.

The maxillule (Fig. 1, *g*) is ornamented with relatively long, profusely plumose setae. The principal endite of the coxopodite bears a row of nine stout, short, tapered setae. The next distal medial process (a second endite?) is directly prolonged as a sharply tapering, flattened seta, profusely set with marginal ciliation. The basipodite bears medially three long, graduated setae, all plumose. The shortest is proximal and equals about two-thirds the length of the distally placed longest. The middle seta is intermediate in length. The endopodite bears four long, plumose setae, two borne terminally and two on the medial margin. The exopodite is slightly more expanded than the endopodite and has three setae widely spaced along its somewhat truncate margin. The epipodite is set with a long plumose seta, directed basally and with a more distally placed, very short, sharply tapered auxiliary seta.

The maxilla (Fig. 1, *h*) is seemingly of primitive construction. It is 5-segmented; each segment bears one or more profusely ciliated, elongate setae. The basal segment bears a proximal trio of long setae, set more or less transversely to the main axis of the appendage on a well-developed protuberance. The next distal medial prominence bears a single long, plumose seta. The third prominence has a pair of equal, long, plumose setae. The terminal prominence of the segment bears two equal plumose setae; set at the base of these is a very short auxiliary seta. The second segment bears a pair of setae with an accompanying, basally placed, short auxiliary seta. The more proximal of the principal setae is equivalent in length to those of the basal segment. The distal seta is about two-thirds as long as the other, of about the same thickness; it is the homologue of the heavily developed claw that occurs in many closely related notodelphyoids. The third segment bears one plumose seta; the fourth segment is distinctively set with one long, plumose seta and a second, much shorter and slenderer seta. The terminal segment bears a distally arranged trio of plumose setae, one of which is equivalent in dimensions with the majority of the setae of the appendage, the remaining two shorter and slenderer by about one-third. All are plumose.

The maxilliped (Fig. 1, *i*) is a flat, unsegmented plate, preserving, however, indications of direct derivation from a 2-segmented condition. A distal pair of subequal, long, plumose setae is set on a well demarcated projection of the appendage. The medial margin bears two quartets of roughly equal, short, plumose setae.

The swimming legs are distinctive as indicated in the figures and in the following tabulation of arrangement of setae and spines. Setae are designated in Arabic numerals following designation of spines in Roman. The segments of each ramus are accounted for in order from the basal segment distally. First exopodite I-1; I-1; IV-3; first endopodite O-0; O-6. Second exopodite I-1; I-1; V-4; second endopodite O-1; O-8. Third exopodite I-1; I-1; IV-4; third endopodite O-1; O-8. Fourth exopodite I-1; I-1; IV-3; fourth endopodite O-1; O-7.

All the legs are heavily chitinized. None bears medial setae on the coxopodite. All bear a seta, variously developed, at the lateral edge of the basipodite. The endopodites are all 2-segmented. The lengths of the exopodites are graduated, the fourth being at least twice as long as the first. The elongation is mainly due to increased production of the terminal segment of each exopodite.

In the first legs (Fig. 1, *j*) the rami are subequal. The lateral seta of the coxopodite is very long, stout and plumose. The basipodite bears medially a stout, curved, tapered spine which reaches to about the beginning of the distal third of the terminal segment of the endopodite. The setae of the terminal segment of the exopodite are short, exceeding the inner terminal spine by about half its length. The endopodite (Fig. 1, *k*) is highly distinctive; it is heavily chitinized. The elongate, terminal segment curves laterally and distally. The setae are all very long and profusely plumose.

In the second legs (Fig. 1, *l*) the endopodite reaches slightly beyond the second segment of the exopodite. The terminal exopodite segment is slightly shorter than the combined lengths of the two proximal segments. The third endopodite reaches just beyond the second segment of the third exopodite. The terminal segment of the latter exceeds the combined lengths of the proximal two segments by about one-third. In the fourth legs (Fig. 1, *m*) the endopodite does not quite reach to the distal margin of the second segment of the exopodite. The length of the distal segment of the exopodite exceeds the proximal segments by half again their combined lengths. The setae of these swimming legs are in the main very long and plumose. Notably excepted are the setae of the third and fourth exopodites. These are short and slender; their consistency approaches more or less that of the spines and they lack the usual plumose ciliation.

The fifth legs (Fig. 1, *n*) are much reduced. In general aspect they are reminiscent of those in *Botachus*. The basal portion is more or less coalesced with the substance of the somite. A plumose lateral seta is borne on a slightly elevated basal prominence. The free segment is short and narrow. It bears a medial subapical spine and a relatively short terminal seta. The basal plate and free segment are heavily chitinized. The terminal seta is seemingly lacking in ornamentation.

The caudal rami (Fig. 1, *o*) are flat, heavily chitinized plates. The armature consists of a long, terminal, articulated claw, a more proximal, short, heavy, spinelike claw, and 3 short setae.

MALE (Figs. 1, *p*, *q*): a more or less generalized notodelphyoid type, possibly tending somewhat to compression of the metasome. The integument is of normal aspect, lacking the marked sclerotization seen in the female. There are no cuticular pores detectable in the specimens seen. The meta-

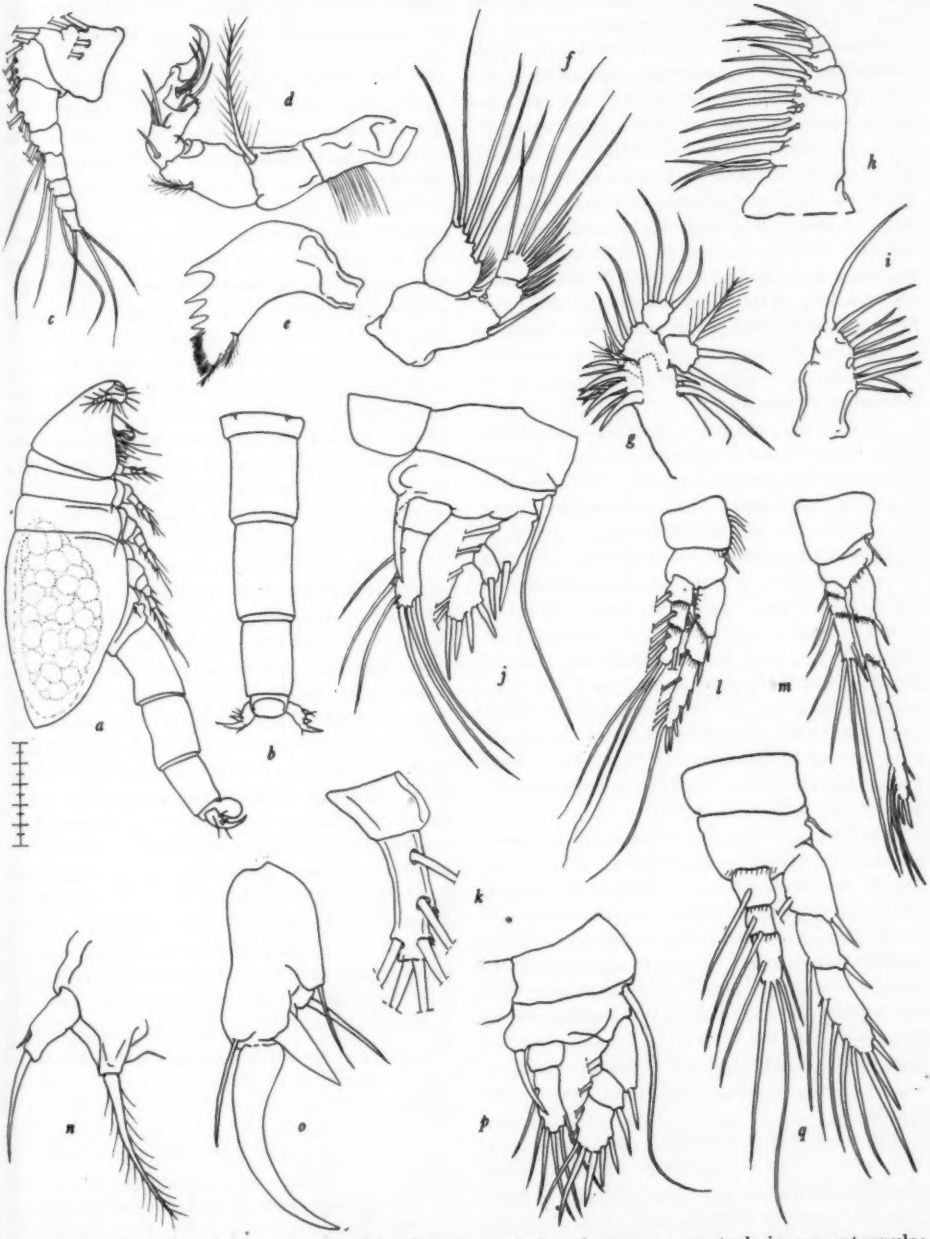


FIG. 1.—*Ustina clarki*, n. sp. Female: *a*, Habit, lateral view; *b*, urosome, ventral view; *c*, antennule; *d*, antenna; *e*, masticatory plate of mandible; *f*, mandibular palp; *g*, maxillule; *h*, maxilla; *i*, maxilliped; *j*, first leg; *k*, first endopodite; *l*, second leg; *m*, fourth leg; *n*, fifth leg; *o*, caudal ramus. Male: *p*, First leg; *q*, fourth leg. The scale, referring only to the figure of the habit of the female, represents 0.5 mm. To avoid complication of detail the plumose ciliation of most setae depicted has been omitted; this detail can be supplied from the description.

some is 5-segmented, comparable, except for the lack of the inflated incubatory structures, to the tagmosis in the female. The urosome is 6-segmented, modified in its thoracic component by the complicated male reproductive structures. The first urosomal somite is short and bears at its posterior margin fifth legs entirely comparable with those in the female. The second segment is twice as long and bears the usual sixth leg lappets, each terminating in a prolongation bearing two subequal setae. The succeeding three segments are subequal; the first of these is half again as long as the combined lengths of the first two segments. The terminal somite is comparable to that in the female, heavily chitinized, but lacking the elaborately developed cuticular structure of the other sex.

None of the cephalic or thoracic appendages, other than the sexually modified sixth legs exhibits specialization toward copulatory prehension. The head appendages and maxillipeds are comparable to those in the female, although of smaller absolute dimensions and with somewhat less substantial structure. The swimming legs are not so modified as those in the female, retaining a more generalized aspect. The segmentation differs by the fact that the endopodites of the second, third and fourth legs preserve the basic 3-segmented condition. The ornamentation differs from that in the female in the following particulars: second endopodite O-1; O-2; O-6. Third endopodite O-1; O-2; O-6. Fourth exopodite I-1; I-1; IV-4; fourth endopodite O-1; O-2; O-5.

The first legs (Fig. 1, *p*) exhibit segmentation and ornamentation comparable to that in the female, but with over-all reduction in size and substance. The exopodites in the second through fourth legs exceed the endopodites by about the length of the terminal exopodite segments. These terminal segments in each case are shorter than the combined lengths of each two basal segments. The fourth leg (Fig. 1, *q*) is depicted to show the departure in configuration of segments and degree of ornamentation from the condition in the female.

The length of the male is 1.1 mm.

Remarks.—The copepod here described raises some difficulty when an attempt is made to place it in the scheme of classification of the notodelphyoids. The existing generic definition most aptly accommodating its characteristics would be *Notopterophoroides* Schellenberg, 1922. However, when characters of the present species, those of *Botachus*, the species of *Notopterophorus*, *Pachypygus* and the two species of *Notopterophoroides* are compared, it would seem as though a set of variations around a basic ground plan is discernible. Unifying characters would be: considerable similarity of antennule; general similarity of construction of mandibular palp; more or less graduated reduction in maxillular ornamentation, in structure of maxilla, and of maxilliped; individual but more or less consistent modifications of swimming legs; reduction of fifth legs; and great similarity of construction of urosome with markedly consistent modification of the anal somite and caudal rami. It seems supportable that here among the notodelphyoids is still another series of related forms comparable to the groups varying around the *Notodelphys* mode and the *Doropygus* mode respectively. The present series exhibits characters (structure of antennule, for instance) which might be considered more primitive than those of *Doropygus*; others indisputably are more highly derived. By comparison with *Notodelphys* some of this group display a possibly more basic condition in having the somite of the first swimming legs a free segment. Since very probably there are yet undiscovered a considerable number of notodelphyoids which might furnish elucidation of the so far seemingly random distribution of the basic characters, it seems best at the present level of knowledge to indicate supraspecific identity as strongly as possible. Accordingly separation is here recognized of all the aforementioned genera, and for the newly described form generic status is proposed. The species of *Notopterophoroides* seem to be rather arbitrarily united in the generic delimitation. Since Lang, 1949, by designation of *N. armadillo* Schellenberg as genotype has fixed the generic concept, the second species, *N. malacodermatus* Schellenberg, seems only questionably appropriately referable to the genus. However, until the discovery of other species and clarification of the characters of the latter species, it seems preferable to refrain from attempting further generic separation.

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ZOOLOGY.—*The grass shrimps of the genus* Hippolyte *from the west coast of North America.*[1]

FENNER A. CHACE, JR., U. S. National Museum.

Two species of *Hippolyte* have been described from the Pacific coast of North America. One, *Hippolyte californiensis*, has been recorded from several localities between Sitka, Alaska, and Santa Inez Bay, Baja California. The other, *H. mexicana*, was described by me from a series of mutilated specimens from the latter locality. I am now convinced that *H. mexicana* represents the previously undescribed male of *H. californiensis*. Examination of material in the collections of the U. S. National Museum indicates, however, that specimens from the northern part of the recorded range of *H. californiensis* are very distinct from those from the southern part and that they belong to a hitherto undescribed species.

It is a pleasure to name this species after Austin H. Clark, retiring curator of echinoderms, U. S. National Museum, in recognition not only of his outstanding contributions to our knowledge of many groups of animals but, especially, of his even broader influence on natural history through the assistance and encouragement he always has ready for biologists whose major goals still lie ahead.

Hippolyte californiensis Holmes

Figs. 1, *a–e*

Hippolyte californiensis Holmes, 1895, p. 576, pl. 20, figs. 21–26 (type locality, Bodega Bay, Calif.; cotypes, U.S.N.M. no. 18697); 1900, p. 193.—Rathbun, 1904, p. 56 (part).—Schmitt, 1921, p. 48 (part), figs. 26, a–b (not fig. 26, c); 1924a, p. 165 (part); 1924b, p. 387.—Chace, 1937, p. 126.

Hippolyte mexicana Chace, 1937, p. 127, fig. 6 (type locality, Santa Inez Bay, Baja California, Mexico; holotype, no. 361076, Department of Tropical Research, New York Zoological Society).

Female.—Carapace not inflated. Four pairs of subequally spaced tufts of plumose setae on dorsal part of carapace. Supraorbital spine reaching forward about as far as, or slightly beyond, hind margin of orbit. Antennal spine small, separated by a U-shaped notch from suborbital angle; the latter is blunt, but produced nearly or quite as far as the antennal spine. Branchiostegal spine prominent and set far back from anterior margin of carapace, the tip falling short of the margin by at least half the length of the spine.

Rostrum reaching not quite as far as, or a little beyond, end of antennal scale. Upper margin straight, or a little concave, and armed with three or four teeth behind the tip. The tip is usually bifid, the upper tooth overreaching the lower. Lower margin set on a very narrow crest, slightly wider than the dorsal one, and armed with three to five teeth behind the tip. Supporting ridge on each lateral face of rostrum very sharp posteriorly, becoming blunt and finally indistinct on the anterior half.

Third somite of abdomen produced in a very low, rounded cap over anterior portion of fourth somite. There is a tuft of plumose setae on each side of the cap near the margin, and another pair near the middle. Fifth somite unarmed. Sixth somite one and three-fourths times as long as fifth. Telson as long as sixth somite, flattened dorsoventrally, and armed with two pairs of lateral spines, the anterior pair inserted not quite half way from the base to the tip of the telson, and the posterior pair about midway between the first pair and the tip; there are six or seven terminal spinules, the two submedian pairs about subequal in length and longer than the lateral pair.

Cornea of eye wider than stalk and not reaching as far forward as tip of stylocerite. Stylocerite slender, sharp, and separated from main portion of segment by a narrow emargination. First antennular segment armed with an outer distal spine (and sometimes a smaller spine mediad to the first). Second segment about twice as long as third. Inner flagellum made up of 18 to 22 segments, the outer one of 9 to 11 segments the first 6 to 8 of which are somewhat inflated. Antenna with a lower spine on basis. Scale narrow with subparallel sides, the inner angle of the blade strongly produced far beyond the outer spine.

External maxillipeds rather stout and reaching somewhat beyond the tip of the spine on the basis of the antenna. The exopod is well developed. First legs robust, unarmed; carpus distinctly longer than palm. First joint of carpus of second legs a little over twice as long as second,

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which is about three-fourths as long as third (one specimen examined has the second joint fully as long as the third); chela usually shorter than combined lengths of second and third joints of carpus. Third leg reaching forward nearly as far as end of antennular peduncle; merus with three to five lateral spines; carpus with one; propodus very slender, armed ventrally with about seven spines, increasing in size distally; dactyl long and slender, with three stout spines at tip and ten to thirteen on lower margin, increasing in size distally. Fourth leg extending forward about as far as end of antennal peduncle; merus armed with three lateral spines; carpus with one; propodus and dactyl as in third leg. Fifth leg reaching forward to terminal third of basis of antenna; merus and carpus armed with one spine each; propodus and dactyl as in leg 3.

Male.—Rostrum slender, reaching about to middle of second antennular segment, and straight or slightly downcurved throughout its length. Rostral margins subparallel, armed dorsally with two to four, usually three, teeth, and ventrally with one to three, usually two, teeth near the tip.

Sixth abdominal somite about one and three-fourths times as long as fifth, as in female, but telson is slightly longer than the sixth somite.

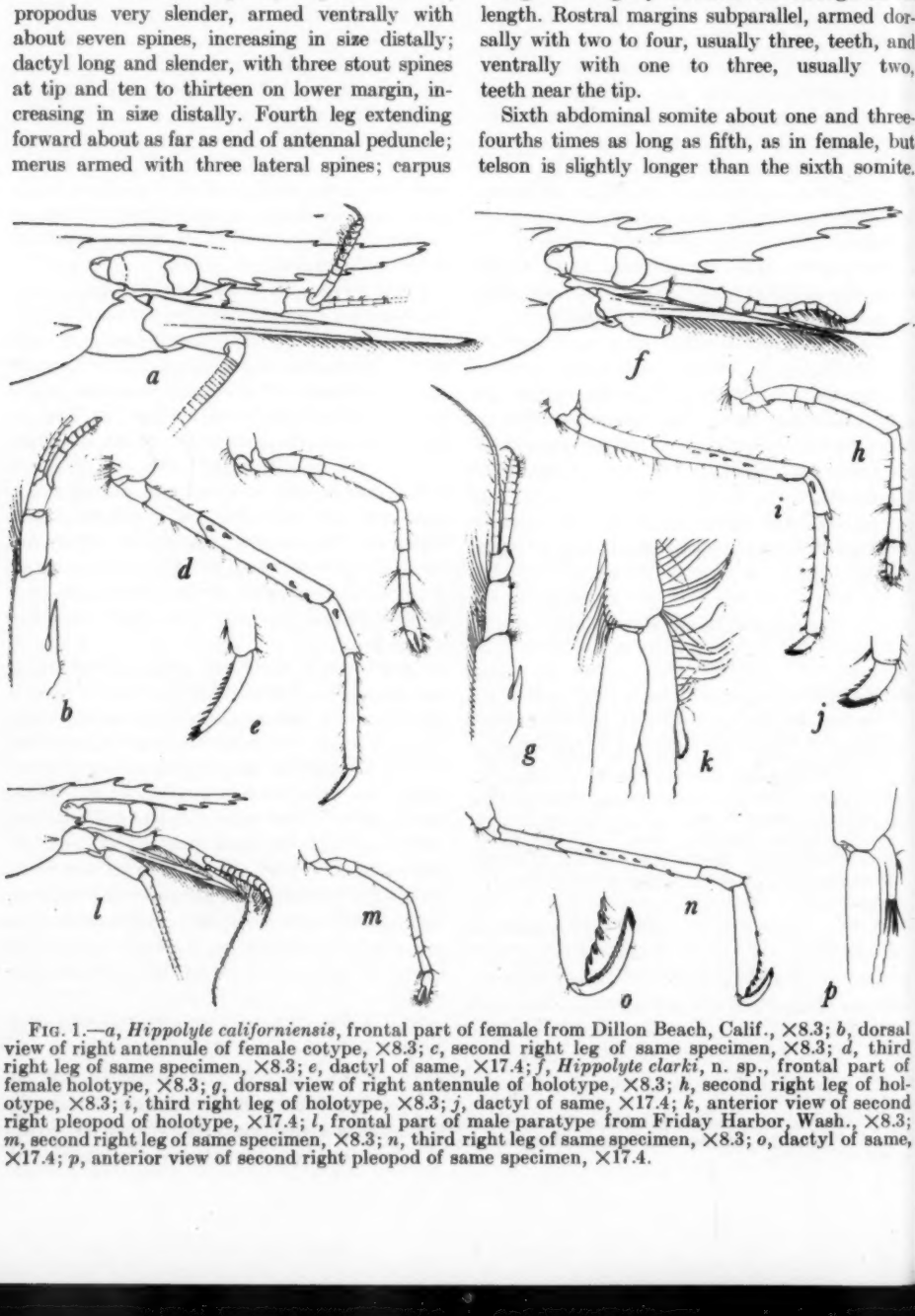

FIG. 1.—*a*, *Hippolyte californiensis*, frontal part of female from Dillon Beach, Calif., ×8.3; *b*, dorsal view of right antennule of female cotype, ×8.3; *c*, second right leg of same specimen, ×8.3; *d*, third right leg of same specimen, ×8.3; *e*, dactyl of same, ×17.4; *f*, *Hippolyte clarki*, n. sp., frontal part of female holotype, ×8.3; *g*, dorsal view of right antennule of holotype, ×8.3; *h*, second right leg of holotype, ×8.3; *i*, third right leg of holotype, ×8.3; *j*, dactyl of same, ×17.4; *k*, anterior view of second right pleopod of holotype, ×17.4; *l*, frontal part of male paratype from Friday Harbor, Wash., ×8.3; *m*, second right leg of same specimen, ×8.3; *n*, third right leg of same specimen, ×8.3; *o*, dactyl of same, ×17.4; *p*, anterior view of second right pleopod of same specimen, ×17.4.

Eyes reaching forward about to end of stylocerite. First antennular segment armed with row of three spines on distal margin. Outer antennular flagellum composed of about 16 segments, the proximal 10 of which are inflated.

External maxillipeds reaching beyond tip of antennal scale. Legs proportionately longer than in female; third legs reach well beyond end of antennal scale. Propodi of last three pairs very broad and flat in distal half. Dactyls of these legs armed with about 16 spines on lower margin and two large apical spines, which are followed on the distal end of the upper margin by a row of five spines which become progressively smaller proximally.

Color.—Green (Holmes); green with pink margins (Hilton).

Measurements.—Carapace lengths of smallest ovigerous female and largest female examined, 4.9 and 6.8 mm, respectively. Carapace lengths of males, 2.7 to 3.8 mm.

Range.—West coast of North America from Bodega Bay, Calif., to the Gulf of California.

Material examined.—Bodega Bay, Calif.; from University of California; 2 females (1 ovigerous), cotypes (U.S.N.M. no. 18697).

Dillon Beach, Marin County, Calif. (tide flats in eel-grass area); June 8, 1941; G. M. Scheibner; 1 female (U.S.N.M. no. 89716).

Mugu Bay, Ventura County, Calif.; May 31, 1923; E. P. Chace; 5 females (3 ovigerous) (U.S.N.M. no. 89710).

Balboa, Calif. (in eel grass); December 26, 1917; W. A. Hilton; from Pomona College; 2 females (1 ovigerous) (U.S.N.M. no. 50659).

San Diego, Calif.; March 9, 1898; *Albatross*; 5 females (2 ovigerous) (U.S.N.M. no. 23403).

Ensenada, Baja California, Mexico; November 28, 1936; S. A. Glassell; 1 female (U.S.N.M. no. 89678).

Off Cape San Lazaro, Baja California, Mexico (in kelp); March 28, 1936; *Zaca* Expedition; 1 specimen (D.T.R., N.Y.Z.S. no. 361072).

Santa Inez Bay, Baja California, Mexico (in stomach of American eared grebe); April 9, 1936; *Zaca* Expedition; 27 specimens (D.T.R., N.Y.Z.S. nos. 361073, 361077). Same (in stomach of American eared grebe); April 11, 1936; 105 specimens (D.T.R., N.Y.Z.S. nos. 361074, - 361078, and M.C.Z. no. 9501). Same; 1 fathom; April 15, 1936; 1 male (holotype of *H. mexicana*, D.T.R., N.Y.Z.S. no. 361076). Same; 3 fathoms; April 15, 1936; 1 female (D.T.R., N.Y.Z.S. no. 361075).

Hippolyte clarki, n. sp.

Figs. 1, *f–p*

Hippolyte californiensis Rathbun, 1904, p. 56 (part).—Schmitt, 1921, p. 48 (part), fig. 26, c; 1924a, p. 165 (part). Not *H. californiensis* Holmes, 1895.

Female.—Carapace not inflated. A pair of tufts of plumose setae on cardiac region and another on anterior gastric region. Supraorbital spine not large, reaching forward slightly beyond hind margin of orbit. Antennal spine small, separated by a U-shaped notch from suborbital angle; the latter is blunt, but produced about as far as the antennal spine. Branchiostegal spine prominent and set well back from anterior margin of carapace, the tip falling short of the margin by nearly half the length of the spine.

Rostrum extending well beyond end of antennal scale. Upper margin concave in the proximal third and straight and ascending distally, or concave throughout, and usually armed with two teeth above the eye; occasional specimens are found with one or three teeth on the dorsal margin behind the tip. The tip is usually trifid, a small tooth being placed on each margin just back of the apex; occasionally either the dorsal or ventral subapical tooth may be absent (one specimen examined has two subapical teeth on the upper margin, causing the tip of the rostrum to appear quadridentate). Lower margin with a narrow crest, deepest at about the end of the proximal third, and armed with one to five teeth. Supporting ridge on each lateral face of rostrum blunt, not sharply carinate, although prominent proximally.

Abdomen with a pair of tufts of plumose setae on posterior parts of first and second somites and two pairs of such tufts on third. Third somite produced in a low, blunt cap over anterior part of fourth somite. Fifth somite unarmed. Sixth somite nearly twice as long as fifth. Telson slightly shorter than sixth somite, flattened dorsoventrally, and armed with two pairs of lateral spines, the anterior spine inserted at a point not quite halfway from the base to the tip of the telson, and the posterior one about midway between the first pair and the tip; there are from six to eight terminal spines, of which the submedian pair is the longest.

Cornea of eye wider than stalk, forming a rather bulbous tip to the stalk, and reaching forward about to the end of the stylocerite. Stylocerite sharp, separated from first segment of

antennular peduncle by a narrow emargination. First antennular segment unarmed distally. Second and third segments slender, the second segment fully twice as long as the third. Inner flagellum made up of 16 to 22 segments, the outer one of 8 to 11, of which the first is usually very long and all but the last three or four moderately inflated. Antenna with a lower spine on basis. Scale narrow with subparallel sides, the inner angle of the blade angular and produced far beyond the level of the outer spine.

External maxillipeds rather slender, reaching nearly as far as end of antennal peduncle. There is a fairly well developed exopod. First legs robust, unarmed; carpus distinctly longer than palm. First joint of carpus of second legs nearly three times as long as second, which is slightly shorter than the third; chela a little shorter than the combined lengths of the second and third joints of the carpus. Third leg reaching forward about to end of antennal scale; merus with two to five lateral spines; carpus with one; propodus slender with subparallel sides and armed ventrally with five to seven pairs of spinules increasing in length distally, the inner spine of each pair being much shorter than the outer; dactyl broad and short, armed with six to eight ventral spines and a double row of eight longer ones crowded onto the distal half of the upper margin. Fourth leg extending forward nearly to end of second segment of antennular peduncle; merus armed with up to five lateral spines; carpus with one; propodus and dactyl as in third leg. Fifth leg reaching forward about to end of first antennular segment; merus armed with up to four lateral spines; carpus with one; propodus and dactyl as in third leg.

Male.—Rostrum slender, reaching about to end of antennular peduncles, and somewhat upcurved distally. Rostral margins subparallel. Rostral armature roughly as in females (one male examined has no ventral tooth); the tip is often more obscurely trifid than in the female, because either the dorsal or ventral subapical tooth may be placed farther from the tip.

Third segment of abdomen lower than in the female, the cap over the proximal portion of the fourth somite less pronounced.

Eyes reaching forward well beyond end of stylocerite. Outer antennular flagellum composed of 8 to 16 segments, all but the terminal 3 to 5 of which are somewhat more noticeably inflated than in the female.

External maxillipeds reaching well beyond end of antennal peduncle. All of the legs are longer than in the female; third legs overreach antennal scale by length of dactyl and most of propodus. Propodi of last three pairs very broad and flat in distal half, the inflated portion being armed with seven pairs of large spines. Dactyls of these legs elongate, ending in a strong spine, with a row of about 14 spines on lower margin and five or six pairs of close-set spines on distal third of upper margin.

There is but one appendix on the endopod of the second pleopods, but that is strongly setose, unlike the stylambys in the female.

Age variation.—In small specimens the rostrum is shorter, reaching just to the tip of the antennal scales in females, and the cornea is no wider than the eyestalk. As in other species of the genus, the younger the specimen, the fewer are the segments in the antennular flagella.

Measurements.—Carapace lengths of smallest ovigerous female and largest female examined 3.0 and 6.0 mm, respectively. Carapace lengths of males 1.7 to 3.2 mm.

Range.—West coast of North America from Sitka, Alaska, to Puget Sound. A lot of 47 specimens collected by the *Anton Dohrn* is labeled "Southern California," but this locality seems doubtful.

Material examined.—Sitka, Alaska; 10 fathoms; June 15, 1899; station 1; Harriman Expedition, W. E. Ritter; 1 female (U.S.N.M. no. 25846).

Barclay Sound, British Columbia; September 27, 1888; *Albatross*; 1 ovigerous female (U.S.N.M. no. 28330).

Nanaimo, British Columbia; C. H. O'Donoghue; 2 males, 1 female (U.S.N.M. no. 54720).

Friday Harbor, Wash.; in eel grass; August 5, 1928; K. L. Hobbs; 1 ovigerous female holotype (U.S.N.M. no. 91089); 18 males, 13 females (7 ovigerous) (U.S.N.M. no. 63089).

Quarantine Rock, Port Townsend, Wash.; June 27, 1903; *Albatross*; 2 males, 1 ovigerous female (U.S.N.M. no. 31866).

Puget Sound; 1895; T. Kincaid; 7 ovigerous females (U.S.N.M. no. 25835).

"Southern California"; *Anton Dohrn*; from Venice Marine Biological Station; 1 male, 46 females (28 ovigerous) (U.S.N.M. no. 50428).

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TABLE 1.—DISTINGUISHING CHARACTERS OF THE WESTERN NORTH AMERICAN SPECIES OF HIPPOLYTE

Hippolyte californiensis		*Hippolyte clarki*	
Female	Male	Female	Male
ROSTRUM:			
Reaching not quite as far as, or a little beyond, end of antennal scale.	Falling short of end of second segment of antennular peduncle.	Reaching well beyond end of antennal scale in adults.	Reaching about to end of antennular peduncle.
Nearly horizontal or faintly upcurved.	Horizontal or slightly downcurved.	Distinctly upcurved or ascending.	Slightly upcurved distally.
Armed with 3–4 dorsal and 3–5 ventral teeth in back of terminal set, tip usually bifid.	Armed with 2–4 dorsal and 1–3 ventral teeth in back of terminal set, tip usually bifid.	Armed with 1–3 (usually 2) teeth above eye and 1–5 ventral teeth in back of terminal set; tip usually trifid.	Same.
Lateral supporting ridge sharp above eye, becoming blunt distally.	Same.	Lateral supporting ridge blunt throughout its length.	Same.
ABDOMEN:			
Cap on third somite very low.	Same.	Cap on third somite slightly higher and more prominent.	Same.
Sixth somite about 1¾ times as long as fifth.	Same.	Sixth somite nearly twice as long as fifth.	Same.
EYE:			
Not reaching forward as far as tip of stylocerite.	Reaching forward about to tip of stylocerite.	Reaching forward about to tip of stylocerite.	Reaching forward nearly to end of first antennular segment.
ANTENNULAR PEDUNCLE:			
First segment armed with 1–2 outer distal spines.	First segment armed with 3 outer distal spines.	First segment unarmed distally.	Same.
SECOND LEG:			
First joint of carpus little more than twice as long as second.	First joint of carpus barely twice as long as second.	First joint of carpus nearly three times as long as second.	Same.
THIRD LEG:			
Reaching forward nearly as far as end of antennular peduncle.	Reaching forward well beyond end of antennal scale.	Reaching forward about to end of antennal scale.	Overreaching antennal scale by length of dactyl and most of propodus.
Dactyl slender, nearly half as long as propodus, and armed with 10–13 ventral and 3 distal spines.	Dactyl moderately slender, about half as long as propodus, and armed with about 16 ventral and 7 distal spines extending onto dorsal margin.	Dactyl very stout, less than a third as long as propodus, and armed with 6–8 ventral and 8 – 9 distal spines extending nearly to midpoint of dorsal margin.	Dactyl slender, less than half as long as propodus, and armed with about 14 ventral and 5 – 6 distal spines extending a short distance on dorsal margin.

ZOOLOGY.—*Two new primnoïd corals of the subfamily Calyptrophorinae (Coelenterata: Octocorallia).*[1]

FREDERICK M. BAYER, U. S. National Museum.

The vast collections of marine animals obtained by the United States Fish Commission steamer *Albatross* are still yielding new species, two of which are described below. Among the octocorals this is not surprising for a considerable part of the collection has not yet been studied. The first species herein described, taken by the *Albatross* during its Hawaiian cruise (1902), was erroneously included with a previously described species in the original report on the Hawaiian Alcyonaria (Nutting, 1908); the other is from the incomparable collection assembled during the Philippine cruise of the *Albatross* (1906–1910). No complete report upon the collections of the latter expedition has yet been made.

It is a great pleasure indeed to dedicate these two species to Austin H. Clark, retiring curator of echinoderms, U. S. National Museum, and his charming wife, Leila Forbes Clark, librarian of the Smithsonian Institution.

Genus **Calyptrophora** Gray

Calyptrophora J. E. Gray, 1866, p. 25.

Diagnosis.—Primnoïds with branching dichotomous, in one plane or bushy; or lyrate, in one or two parallel planes; or partly in whorls, partly dichotomous. Zooids arranged in whorls, with their mouths directed upward or downward; body scales reduced to two pairs of large, curved plates which are either fused to form two solid rings, or are separate; adaxial buccal (marginal) scales present or absent; no more than one pair of infrabasal scales between the basal body pair and the rind scales. The operculum is well developed, consisting of eight large scales. The spicules of the stem rind are more or less elongate, flattened scales or plates, in one layer.

Genotype.—*Calyptrophora japonica* Gray (by monotypy).

Calyptrophora clarki, n. sp. Fig. 1

Calyptrophora japonica Gray, Nutting, 1908, p. 578 (part).
Not *Calyptrophora japonica* Gray, 1866, p. 25, fig. 1.

Diagnosis.—Branching dichotomous, in one plane. Zooids facing apically; both pairs of body scales fused to form solid rings; basal ring with a pair of long, slender, finely serrate spines; buccal ring with two broad, bladelike, finely serrate processes, which are occasionally bifid or trifid, sometimes completely divided to form four or six separate processes. A pair of well-defined infrabasal scales is present.

Description.—The colony is branched dichotomously, in one plane; the axis is longitudinally grooved and has a golden luster. The zooids (Fig. 1, *D*), which are 2.25–2.50 mm long including the buccal spines (measured parallel to the branch), occur in whorls of four or five (Fig. 1, *A*), and face upward; in 3 cm of branch length there are from 12 to 14 whorls. The zooid body is surrounded by two pairs of large sclerites fused to form rings. The basal ring (Fig. 1, *E*) bears on its free edge a pair of long, slender, finely serrated spines; the buccal ring (Fig. 1, *F*) has two broad, bladelike processes which are sometimes divided more or less completely into two or three points or separate spines. A pair or narrow, curved infrabasals connects the basal ring with the stem scales. Adaxial buccal (marginal) scales are absent. The operculum is high and projects prominently from the buccal ring. The abaxial opercular are the largest, roughly triangular in shape and with a moderately strong inner keel; the adaxials are about half as large and more nearly perfect triangles; the outer lateral and inner lateral operculars are intermediate in size and more or less asymmetrical in outline due to the broadly rounded inner margin which overlaps the edge of the adaxially adjacent scale. The apical margins of the operculars are usually serrate, and in some zooids are divided into several lobes or low points (Figs. 1, *B*, *C*). The spicules of the stem rind are elongate scales without external ridges.

Type.—U.S.N.M. no. 25370.

Locality.—Hawaiian Islands: Ukula Point, Kauai Island, bearing north 65° 30′, west 7.4 miles, 508–557 fathoms, gray sand and Foraminifera, bottom temperature 40° F., June 17, 1902 (*Albatross* station 4007).

Paratype.—U.S.N.M. no. 43139; Hawaiian Islands.

Remarks.—In habit, *Calyptrophora clarki* is

[1] Published by permission of the Secretary of the Smithsonian Institution. Received October 6, 1950.

readily distinguishable from *C. japonica* Gray by its regularly dichotomous instead of lyrate branching. Most zooids of *C. clarki* are at once separable from those of *C. japonica* by the two broad processes of the buccal ring; there is, however, much variation among individuals, even of the same colony, in the character of the buccal spines, and though there are ordinarily but two broad processes, there may occasionally be four, and sometimes even six. None of the specimens of *C. japonica* I have examined show six buccal spines. Both the buccal and the basal spines of *C. clarki* are proportionally much longer than those of *C. japonica*, except perhaps for Versluys' specimen no. 3 of his "form B" (1906, p. 118, figs. 166–168), which is probably not *C. japonica* at all but something close to the present species.

Genus **Narella** Gray

Narella J. E. Gray, 1870, p. 49.
Stachyodes + *Calypterinus* Th. Studer [and E. P. Wright], 1887, p. 49; E. P. Wright and Th. Studer, 1889, pp. xlviii, 53, 54.

Diagnosis.—Primnoïds mostly branched dichotomously, in one plane or bushy. Zooids arranged in whorls, with their mouths directed downward; body scales three pairs of large, curved plates, of which the basal pair may meet adaxially to form a closed ring (in one species the buccal pair also); adaxial buccal (marginal) scales are frequently present in one or more pairs. The operculum consists of eight large scales. Spicules of the stem rind variable, elongate or scalelike, in one or two layers.

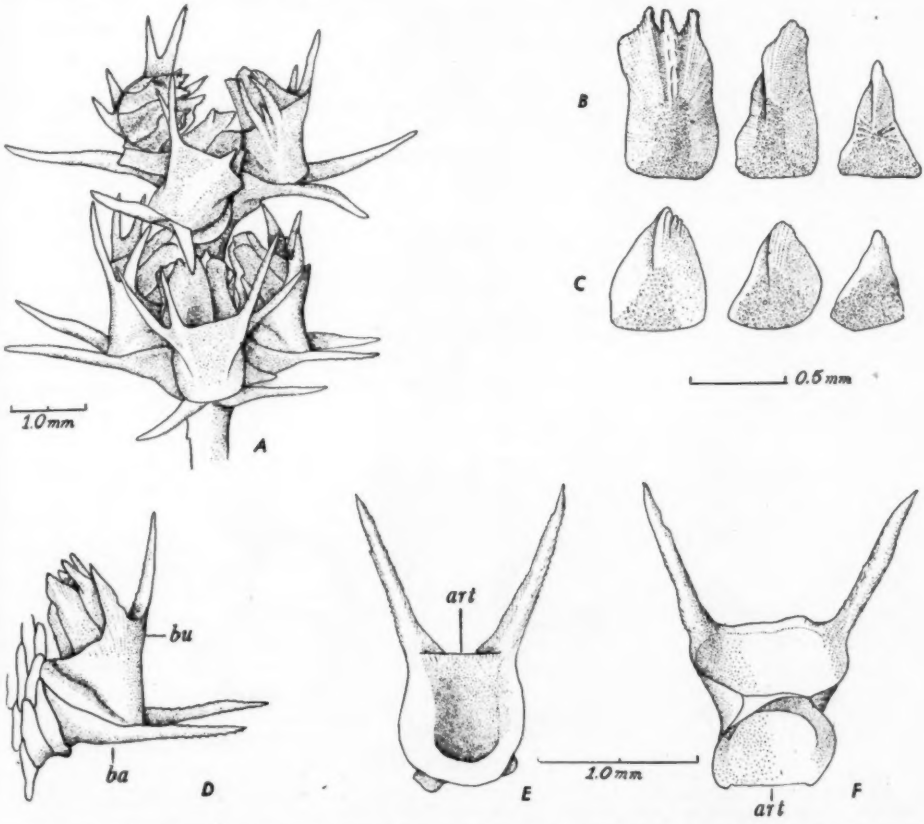

FIG. 1.—*Calyptrophora clarki* n. sp. *A*, Two distalmost whorls from the type specimen; *B*, three opercular scales, abaxial, inner lateral and adaxial, of the large, laciniate type; *C*, the same, of the small type; *D*, typical zooid, side view; *E*, basal scale ring: *art*, articulating ridge; *F*, buccal scale ring: *art*, articulating ridge which rides on that of the basal ring.

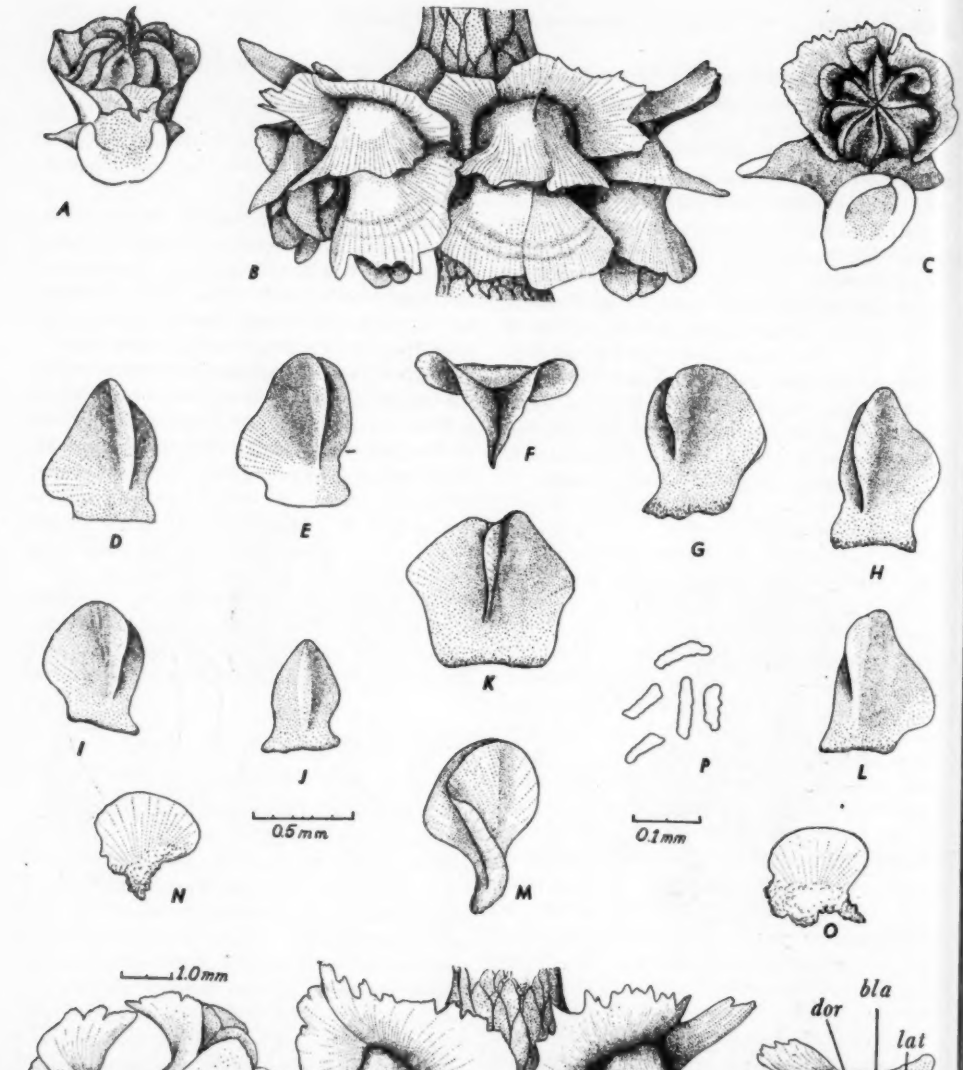

FIG. 2.—*Narella leilae* n. sp.: *A*, Adaxial view of zooid showing adaxial buccal scales; *B*, a whorl of normal zooids; *C*, opercular view of zooid; *D–M*, opercular scales: *F*, *K*, *M*, apical, inner face, and side view of major abaxial opercular scale; *N*, *O*, adaxial buccal scales (scale at *J* applies to all opercular scales); *P*, small flattened rods from the tentacles (scale applies only to *P*); *Q*, zooid whorl from above, showing worm tunnel (scale applies only to *Q*); *R*, zooid whorl from side, showing "arcade polyps" with abnormally expanded basal scales (scale applies to *A–C*, *R*, *S*); *S*, normal zooid from the side, showing: *dor*, "dorsal" and *lat*, lateral regions of basal scale; and *bla*, the basolateral angle which separates the two.

Genotype.—*Primnoa regularis* Duchassaing and Michelotti, 1860 (by monotypy).

Remarks.—As Miss Deichmann (1936, p. 168) points out, *Narella* clearly has priority over *Stachyodes*. The genus *Calypterinus* was established for a specimen with abnormal polyps due to a polychaete commensal. Calyptrophorines, especially *Narella*, are frequently infested with worms which cause adjacent polyps along one side of the stem to form greatly expanded basal scales which produce a sort of arcade in which the worm makes its home (Fig. 2, *Q*, *R*).

Narella leilae, n. sp. Fig. 2

Diagnosis.—Branching lateral-dichotomous, in one plane. Zooids small, 2.0–2.5 mm long, facing basally; only basal scale pair meeting adaxially to form a ring; free margins of all three body-scale pairs broadly expanded but not forming long, projecting points; free lateral border of each basal scale with a downward and forward projecting angle; basal scale distinctly divided into dorsal and lateral regions by a basolateral angle. Operculum low, the individual scales broad, with a high inner keel.

Description.—The type consists of three fragments, the largest of which is about 70 mm tall and twice branched dichotomously. In the proximal part the axis is a little flattened in the plane of branching, oval in the lowest part of the type specimen, becoming almost round in the distalmost tips; it is longitudinally grooved, and of a brownish-yellow color with moderate luster. The downward facing zooids (Fig. 2, *S*) are 2.0–2.5 mm long (measured parallel to the branch), arranged in whorls of four to six (Fig. 2, *B*), of which 10–12 occur in 3 cm of axial length. The zooid body is surrounded by three pairs of large scales, of which only the basal pair meet adaxially to form a ring; the free edges of all three pairs are broadly expanded, those of the basal and medial pairs more or less reflexed while that of the buccals is curved a little inward; basals bent along a definite basolateral angle which divides the scale into dorsal and lateral regions; the free lateral edge of the basal scale has a forward and downward projecting angle (Fig. 2, *S*). The operculum is very low; the scales are broad, the largest abaxial almost pentagonal in face view (Fig. 2, *K*), and each is furnished with a very high keel on the inner face and corresponding groove on the outer (Fig. 2, *D–M*). One pair of adaxial buccals is present (Fig. 2, *A*, *N*, *O*). The tentacles contain very small (0.04–0.07 mm) flat rods (Fig. 2, *P*). The coenenchyma scales are irregular, rather elongate plates, those nearest to zooids often with a high, thin longitudinal crest.

Type.—U.S.N.M. no. 49724.

Locality.—Off Kapoposang Light, Straits of Macassar, lat. 4° 43′ 22″ S., long. 118° 53′ 18″ E., 400 fathoms, hard bottom, bottom temperature 43.3° F., December 28, 1909 (*Albatross* station 5664).

Additional record.—Off Gomomo Island, Pitt Passage, lat. 1° 53′ 30″ S., long. 127° 39′ 00″ E., 400 fathoms, coral, rock, soapstone, (no temperature data), December 3, 1909 (*Albatross* station 5635).

Remarks.—*Narella leilae*, n. sp., shows a certain resemblance to *N. clavata* (Versluys) in its closed basal scale pair and definite basolateral angles; the development of abnormal "arcade polyps" (Fig. 2, *Q*, *R*) induced by polychaete commensals is similar to that of *Narella allmani* (Wright and Studer). *Narella leilae* differs from *N. clavata* in its smaller zooids and exceptionally low operculum, its thinner and more delicate body scales, and in absence of a high dorsal crest on the basals; from *N. allmani* it differs in having adaxially closed basal scales, the buccals not being drawn out into projecting points, and in the much broader opercular scales.

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ZOOLOGY.—*A new species of polychaete worm of the family Polynoidae from Point Barrow, Alaska.*[1]

MARIAN H. PETTIBONE, Arctic Research Laboratory, Johns Hopkins University. (Communicated by Fenner A. Chace, Jr.)

The new species of Polynoidae herein described is part of a collection of polychaetes from Point Barrow, Alaska, collected by George E. MacGinitie, of the Arctic Research Laboratory. The types are deposited in the United States National Museum. I take pleasure in naming it after Austin H. Clark, retiring curator of echinoderms, United States National Museum.

Family POLYNOIDAE
Genus **Eunoë** Malmgren, 1865
Eunoë clarki, n. sp.
Fig. 1, *a–e*

Measurements.—The type (U.S.N.M. no. 21984), of 41 segments, is 38 mm long, 8 mm wide excluding setae, and 12 mm wide including setae. The paratype (U.S.N.M. no. 21985), of 40 segments, is 36 mm long and is of the same width as the type.

Description.—The body is linear-oblong, widest in segments 9 to 27, narrowing slightly anteriorly and slightly more so posteriorly; it is oval in cross section. The middorsum is transversely banded with grayish green; the ventral surface is without color except for the grayish-green coloration anterior and lateral to the mouth. Fifteen pairs of elytra nearly cover the dorsum; they are large, imbricated, arranged on segments 2, 4, 5, 7, 9 . . . 23, 26, 29, and 32. The elytra (Fig. 1, *a*) are oval to subreniform in shape, greenish gray in color, with a darker mottled pattern on most of the exposed parts of the elytra, and with a darker spot medial to a lighter area over the elytrophore —giving the appearance of paired "ocelli" (similar in this regard to *Halosydna brevisetosa* Kinberg). The elytral border is smooth except for scattered clavate micropapillae (Fig. 1, *e*). The elytral surface, although appearing smooth, is furnished with numerous chitinous bluntly conical microtubercles (up to 30μ in height, Fig. 1, *e*).

The prostomium (Fig. 1, *a*) is bilobed, wider than long, somewhat pigmented, with a deep anteromedian notch; cephalic peaks are lacking. The four eyes are small, the posterior pair situated dorsal and slightly posterior to the widest part of the prostomium, the anterior pair are anterolateral. The median antenna has a large pigmented ceratophore; the style is about 1.5 times the length of the prostomium, with a pigmented proximal part, and with very short scattered clavate papillae. The lateral antennae are inserted ventral to the median antenna on the prostomium; the ceratophores are short, darkly pigmented; the styles are short—about half the length of the median antenna—and furnished with short papillae. The palpi are about 2.5 times the length of the prostomium, with longitudinal rows of fine papillae.

The tentacular segment (Fig. 1, *a*) has the basal lobes elongated, pigmented on the basal half, with one seta; the tentacular cirri are longer than the median antenna, about 2.5 times the length of the prostomium, with a wide pigmented zone basally and a narrow darker pigmented ring below the subterminal slightly bulbous enlargement, with a filamentous tip, and with short scattered clavate papillae. The dorsal cirri (Fig. 1, *a*) have elongated cirrophores, bulbous basally and narrower distally; the styles are similar to the tentacular cirri, with or without the basal pigmented zone, and extend beyond the tips of the setae. The dorsal tubercles, corresponding to the elytrophores on the cirrus-bearing segments, are short and bulbous. The ventral cirri are subulate, enlarged basally, tapering distally to filamentous tips (Fig. 1, *b*). The anal cirri are missing. The segmental or nephridial papillae begin on segment 6 and continue posteriorly; they are rather long and cylindrical, especially in the segments of the middle third of the body.

The parapodia (Fig. 1, *b*) are biramous. The notopodium is a rounded lobe on the anterodorsal face of the neuropodium, extending out into a narrower acicular lobe from which the aciculum projects. The notosetae (Fig. 1, *b*, *c*) are amber-colored, moderate in number (about 40), forming a spreading bundle; they are slightly arched, slender to stout (20–80μ in greatest diameter), with long spinous regions extending over half of the exposed length, and short bare pointed to blunt tips. The neuropodium is obliquely truncate distally, with a longer dorsoanterior acicular lobe. The neurosetae (Fig. 1, *b*, *d*) are amber-colored, moderate in size (30–50μ in diameter in the stem

[1] This study was aided by a contract between the Office of Naval Research, Department of the Navy, and Johns Hopkins University. Received October 6, 1950.

region, 36–62μ in greatest diameter in the enlarged distal region), with transverse spinous rows (9–24 or so rows), and rather long bare entire tips.

Remarks.—*Eunoë clarki* resembles in superficial appearance *Halosydna brevisetosa* Kinberg—the common Pacific coast polynoid—particularly in its linear shape and mottled elytral pigmentation with paired "ocelli." It differs from *Eunoë nodosa* (Sars) and *Eunoë oerstedi* Malmgren in lacking macrotubercles and fringes of papillae on the elytra, in the smaller eyes, and in the location of the anterior pair of eyes—anterolateral and not anterodorsal. It might well prove to be commensal in habit, as shown by the small eyes, absence of elytral macrotubercles, and elytral fringes of papillae.

Locality.—Two specimens were collected at Point Barrow base, Alaska, by George E. MacGinitie, October 17, 1949. They were washed ashore after a storm along with many other animals, including numerous polychaetes.

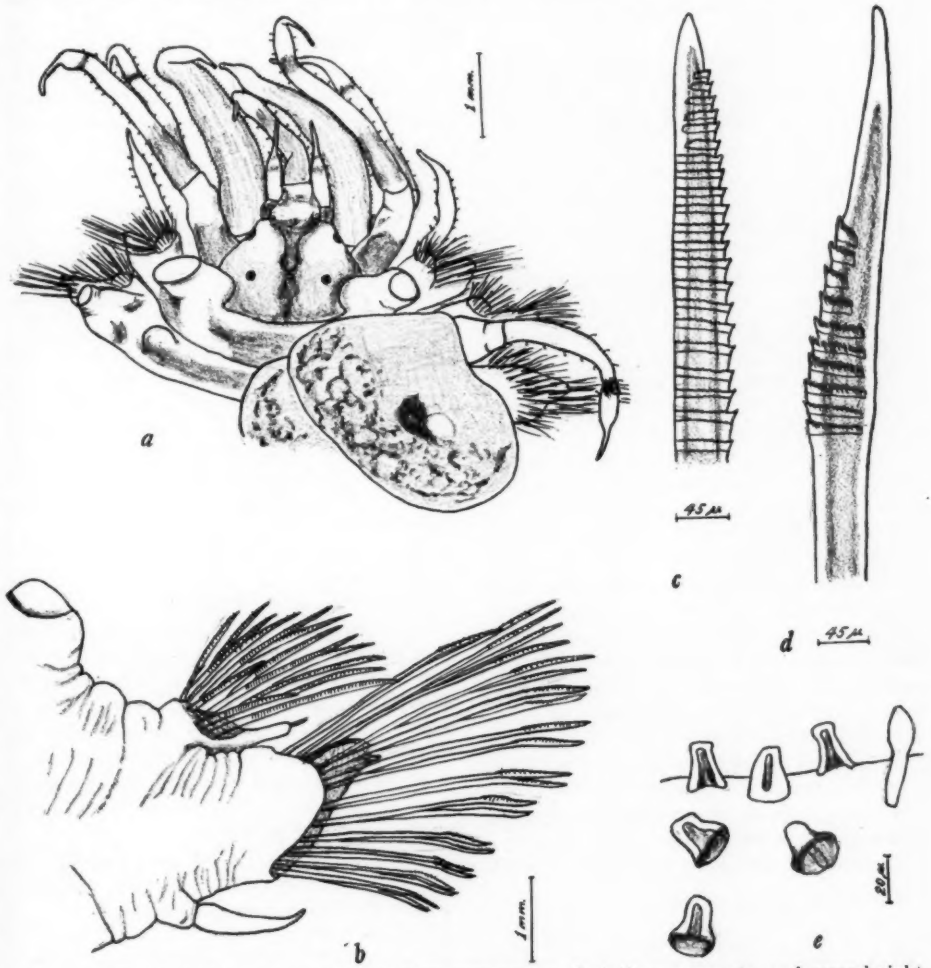


FIG. 1.—*Eunoë clarki*, n. sp.: *a*, Dorsal view prostomium, first three segments, and second right elytron and parapodium of fourth segment (first elytral pair and second left elytron removed); *b*, thirteenth right parapodium, posterior view; *c*, tip of notoseta; *d*, tip of middle subacicular neuroseta; *e*, few microtubercles and papilla from eighth elytron.

ENTOMOLOGY.—*A new genus and species of North American Olethreutidae (Lepidoptera: Laspeyresiinae).*[1]

J. F. GATES CLARKE, Bureau of Entomology and Plant Quarantine.

The new species of olethreutid moth described herein, which becomes the type of a new genus, I take pleasure in naming for my friend Austin H. Clark, retiring curator of echinoderms of the United States National Museum, who, among his other accomplishments, is a lepidopterist of long-standing and world-wide repute.

Corticivora, n. gen.

Figs. 1-1*e*

Typus generis.—*Corticivora clarki*, n. sp.

Head rough; labial palpus not exceeding front, third segment about one-fifth the length of second. Thorax *without* posterior tuft.

Forewing smooth; termen nearly straight; 12 veins, all separate; vein 2 remote from 3; 3, 4, and 5 approximate at bases; 8 and 9 approximate basally; 11 from before middle; upper internal vein of cell from between 10 and 11, very weakly developed. Costal fold absent.

Hindwing *with* normal pecten on lower median vein; 8 veins; 3 and 4 stalked; 6 and 7 stalked; termen slightly concave.

Male genitalia with cucullus narrow and sacculus broad without spine clusters; socii well-developed, fleshy, haired pads; uncus absent.

Female genitalia with signa developed as scobinate-dentate cones.

Structurally *Corticivora* is similar to *Gypsonoma* (Eucosminae) though remaining clearly laspeyresiine. As in *Gypsonoma* all veins of the forewing are separate in *Corticivora* and in the hindwing 3 and 4 and 6 and 7 are stalked. The upper internal vein of *Gypsonoma* arises between 9 and 10 and that of *Corticivora* between 10 and 11. In the hindwing vein 5 of *Gypsonoma* is approximate to 4, whereas that of *Corticivora* is remote from 4.

In both genera the socii are present, a character seldom found in the Laspeyresiinae.

Corticivora appears to be most nearly related to *Laspeyresia* but differs from it by the stalking of veins 6 and 7 of the hindwing, the presence of socii, and the form of the signa.

Corticivora clarki, n. sp.

Alar expanse, 10–11 mm.

Labial palpus sordid whitish; second segment suffused and sparsely irrorate with gray; second segment almost wholly gray externally, except apex. Antenna dark grayish fuscous with narrow, paler annulations. Head creamy white. Thorax grayish fuscous. Ground color of forewing cinereous, the scales narrowly white-tipped; basal patch and other dark markings grayish fuscous as illustrated; narrow subbasal line of cilia black, cilia leaden. Hindwing light grayish fuscous; cilia, except subbasal band, paler. Legs creamy white suffused and banded with grayish fuscous. Abdomen grayish fuscous above, creamy white beneath.

Male genitalia.—As figured. Cucullus with strong, long setae along ventral edge; aedeagus broad and flattended dorsally and distal two-thirds abruptly narrowed, cylindrical, pointed.

Female genitalia.—As figured. Signa conical, studded with sharp scobinate-dentate processes; posterior portion of ductus bursae lightly sclerotized, slender.

Type.—U.S.N.M. no. 60582.

Type locality.—North Guilford, Conn.

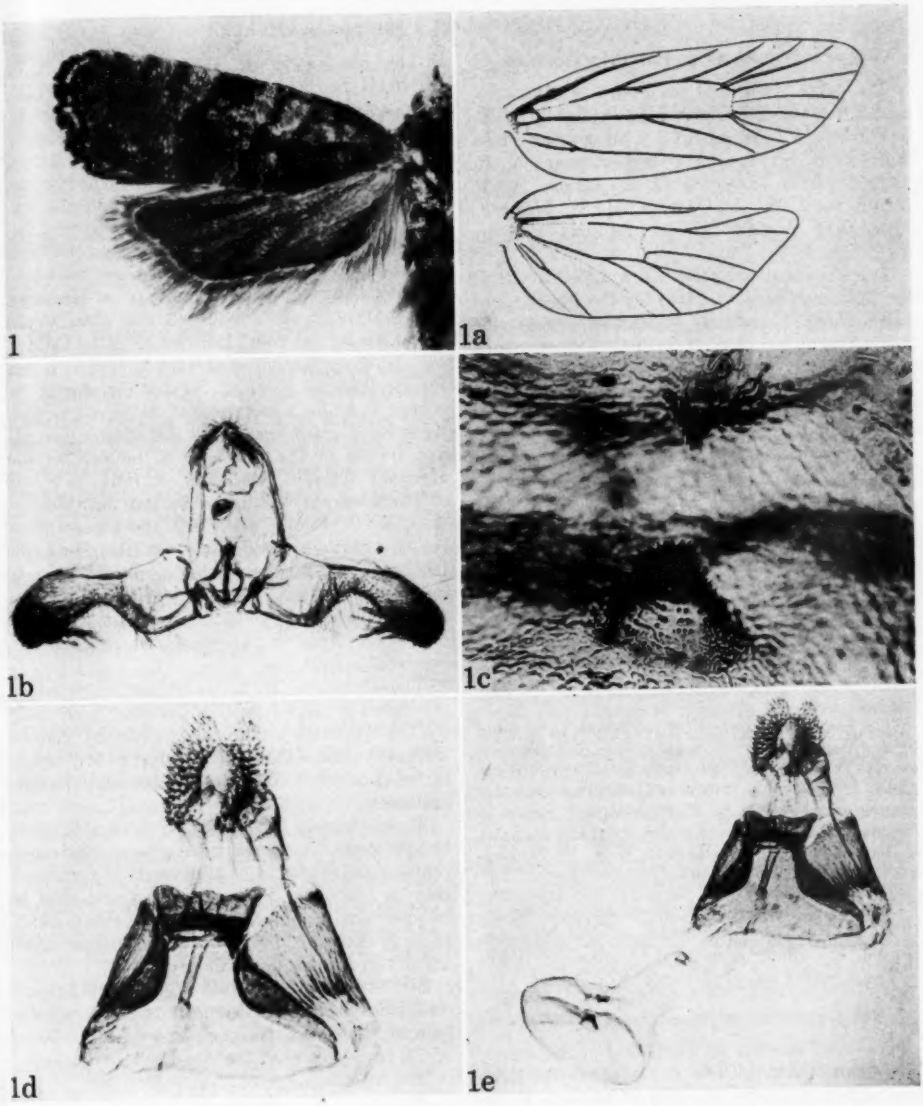
Food plant.—Red pine (*Pinus resinosa* Ait.).

Remarks.—Described from the type male and four male and three female paratypes from the type locality, all reared by G. H. Plumb and J. V. Schaffner. Emergence dates range from June 24 to July 2, 1944. Paratypes in the U. S. National Museum and British Museum (Natural History).

G. H. Plumb, who submitted the above material for identification, will publish the life history of this interesting species.

The photographs for the accompanying figures were taken by Floyd B. Kestner, photographer of the Smithsonian Institution.

[1] Received October 6, 1950.



FIGS. 1–1*e*.—*Corticivora clarki*, n. sp.: 1, Left wings; 1*a*, venation of right wings; 1*b*, ventral view of male genitalia with aedeagus in situ; 1*c*, enlarged view of signa; 1*d*, detail of genital plate and ostium; 1*e*, ventral view of female genitalia.

PROCEEDINGS OF THE ACADEMY

441ST MEETING OF BOARD OF MANAGERS

The 441st meeting of the Board of Managers, held in the Cosmos Club on November 20, 1950, was called to order at 8:03 p. m. by the President, F. B. SILSBEE. Also present were: N. R. SMITH, W. N. FENTON, C. L. GAZIN, A. T. MCPHERSON, W. A. DAYTON, H. W. HEMPLE, MARGARET PITTMAN, F. M. SETZLER, and, by invitation, L. W. PARR.

The President announced the appointment of the following Subcommittee for the Teaching of Science of the Committee on Awards for Scientific Achievement for 1950: B. D. VAN EVERA, chairman, R. P. BARNES, F. E. FOX, T. KOPPANYI, M. H. MARTIN, A. T. MCPHERSON.

Twenty-six persons were elected to membership in the Academy.

The following report of the Nominating Committee was presented:

The Nominating Committee, consisting of the Academy's Vice-presidents, met in the library of the Cosmos Club on November 6, 1950. The meeting was called to order at 5 p. m. by F. C. KRACEK, who presided. Others present were: C. F. W. MUESEBECK, J. S. WILLIAMS, W. A. DAYTON, F. M. DEFANDORF, E. W. PRICE, MARGARET PITTMAN, H. W. HEMPLE, and H. G. DORSEY. F. M. SETZLER acted as secretary but took no part in the balloting.

The nominees selected for the offices to be filled by the balloting of the membership in December were as follows: For *President-elect*, WALTER RAMBERG; for *Secretary*, FRANCIS M. DEFANDORF; for *Treasurer*, HOWARD S. RAPPLEYE; for *Board of Managers* to serve 3 years (two to be elected), SARA E. BRANHAM, MILTON HARRIS, C. F. W. MUESEBECK, JOHN A. STEVENSON.

The Secretary reported the death on June 18, 1950, of FRANK W. SCHWAB, of the National Bureau of Standards (elected October 15, 1945).

The meeting adjourned at 8:40 p. m.

442D MEETING OF BOARD OF MANAGERS

The 442d meeting of the Board of Managers, held in the Cosmos Club on December 18, 1950, was called to order by the President, F. B. SILSBEE, at 8:02 p. m. Also present were: N. R. SMITH, H. S. RAPPLEYE, J. A. STEVENSON, F. M. DEFANDORF, W. R. WEDEL, W. A. DAYTON, C. A. BETTS, E. W. PRICE, MARGARET PITTMAN, F. M. SETZLER, and, by invitation, R. G. BATES.

The President announced the plans for the Encouragement of Science Talent and the Science Fair, indicating that he had requested the customary contributions from the various Affiliated Societies for the support of these activities.

The Chairman of the Committee on Meetings, F. M. DEFANDORF, announced that there would be no regular meeting of the Academy in December. He reported, however, that he had arranged for Dr. PER K. FROLICH, former director of research and now vice-president of Merck & Co., to serve as guest speaker at the annual meeting and dinner of the Academy to be held at the Kennedy-Warren on January 18, 1951.

The Chairman of the Committee on Membership, R. G. BATES, presented the names of 14 resident and 3 nonresident candidates for membership in the Academy. One nonresident candidate previously presented was elected. Two members, HOWARD P. BARSS and VICTOR BIRCKNER, were placed on the retired list, effective December 31, 1950.

The Treasurer, H. S. RAPPLEYE, reported on purchases of office furniture that had been made for the Treasurer's office and requested that an increased allotment of $25 be made to the budget of the Treasurer. The request was unanimously approved.

The Archivist, J. A. STEVENSON, reported that he and former Archivist, N. A. SMITH, had made a final reorganization of all records of the Academy in the office of the Archivist and that he had prepared a detailed inventory of this material to be presented as his report at the annual meeting of the Academy in January.

Mr. STEVENSON also gave an interesting report on the Seventh International Botanical Congress, held in Stockholm, Sweden, July 12–20, 1950, at which he represented the Academy as delegate.

The meeting adjourned at 8:55 p. m.

FRANK M. SETZLER, *Secretary*.

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NOTE

Those whose pleasant task it was to bring together the contents of this number of the JOURNAL of the Washington Academy of Sciences, honoring Austin H. Clark, have endeavored to reflect Mr. Clark's wide interest in the natural sciences, although they did not attempt to include papers in all fields in which he has specialized. Mr. Clark's own paper, on "The Brittle-stars of the United States Navy Antarctic Expedition 1947–48," which he submitted to the editors of the JOURNAL last September, was included in this issue without, of course, the author's knowledge. It seems not unfitting, however, that this example of Mr. Clark's work should appear here in an array of scientific papers by those who seek to do him honor.